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User Manual

KON-TEC E-MATE 50-61-A OUTDOOR

Energy storage $LiFePO_4$

HV energy storage

61,44 kWh

Catalogue

Preface

Main Contents

This manual describes the **KT-LFPHV5.12-12** introduction, transport, installation, operation, maintenance and troubleshooting. Before using this product, be sure to read the manual carefully and operate the energy storage system according to the methods described in this manual, or equipment or personal injury may result.

Target Reader

This document is primarily intended for users:

1. Technical support engineers: responsible for providing professional technical support and consulting to solve technical problems.
2. System Installation Engineer: responsible for on-site installation, wiring and hardware configuration of the energy storage system.
3. Testing engineers: responsible for system debugging and testing to ensure that the system operates normally in accordance with the design requirements.
4. Maintenance engineers: responsible for daily system maintenance and troubleshooting, to maintain long-term stable operation of the system.
5. Product end-users: end-users who utilize energy storage systems and need to understand basic operation and maintenance.

Manual Warning Sign Definition

To help users identify potential safety risks and take appropriate precautions to ensure safety when using the energy storage system. Users should read the manual carefully before using the energy storage system and strictly observe all safety warnings and operating instructions in the manual.

Notation	Descriptions
	Used to warn of an imminently hazardous situation which, if not avoided, will result in death or serious bodily injury.
	Used to convey an equipment or environmental safety warning message indicating a hazard with a medium level of risk that may result in death or severe typhoid fever if not avoided.
	Hazards with a low level of risk of causing minor or moderate harm if not avoided.

1 Safety Precautions

1.1 Safety Instructions

Please strictly observe the terms of the safety regulations in this product manual. In order to avoid possible injury or death and property damage during the use of this product, as well as to improve the service life and use efficiency of this product, please be sure to read the safety regulations carefully.

1. Do not immerse the battery in water;
2. Improper use and storage of the battery poses a risk of fire, explosion, and burns; do not disassemble, crush, incinerate, heat, or throw batteries into fire;
3. Do not expose the battery to fire or prolonged exposure to temperatures exceeding the temperature conditions specified in this manual, as this may result in fire;
4. When batteries reach the end of their useful life, used batteries should be disposed of in a timely manner in accordance with local recycling or waste regulations;
5. Do not disassemble, dismantle or recondition the battery in any way without authorization;
6. Do not mix different sizes and brands of lithium-ion batteries;
7. Do not use the battery if it emits a strange odor, heat, deformation, discoloration or any other abnormal phenomenon;
8. Do not short-circuit the positive and negative terminals of the battery, otherwise strong current and high temperature may cause personal injury or fire;
9. Connect the positive and negative terminals of the battery in strict accordance with the labeling and instructions, and prohibit reverse or series wire charging;
10. Prohibit over charging/over discharging of the battery, otherwise it may cause overheating and fire accidents;
11. Avoid skin and eye contact with the electrolyte when it is leaking. In case of contact, wash the contact area immediately with plenty of water and seek medical help;
12. It is prohibited for any person or animal to ingest any part of the battery or any substance contained in the battery;
13. Batteries are potentially hazardous and must be operated and maintained with appropriate protective measures. Failure to do so may result in serious personal injury and property damage;
14. Prohibit any behavior that may cause deformation of the battery, such as needling, hammering, etc., which may cause a short circuit or fire in the battery.

1.2 Personnel Requirements

1. When operating or maintaining the energy storage cabinet, it's necessary to wear a helmet, insulated gloves, insulated shoes, goggles, it is strictly prohibited to wear watches and other metal jewelry;
2. Only qualified electricians and trained personnel can operate and maintain this product, and complete professional electrical equipment is required;
3. Personnel responsible for the installation and maintenance of the equipment must be strictly trained in the correct operation methods, and be aware of the various safety precautions and the relevant standards of the country/region where they work;
4. Replacement of equipment or parts (including software) must be done by authorized professionals;
5. Keep persons other than those operating the equipment away from the equipment.

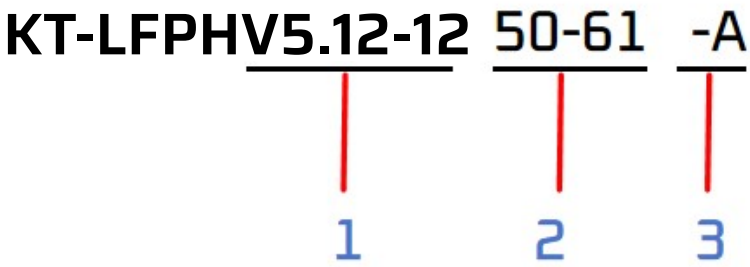
1.3 Electrostatic Protection ⚠

Accumulation of static electricity may cause electric shocks, fires, explosions, failure and damage of electronic devices, etc. There are circuit boards or other static-sensitive components in the energy storage cabinet. Board or other static-sensitive components, in order to prevent or reduce the harm of static electricity, it is necessary to do a good job of static protection, and thus inhibit the generation of static electricity, accelerate the leakage of static electricity, static electricity neutralization. The prevention methods include but are not limited to:

1. During the component replacement process, keep all the components that have not been installed in the ESD shielding bag, and the temporarily removed device is placed on a foam mat with anti-static function;
2. Do not touch solder joints, pins or exposed circuitry.

2 Product Introduction

2.1 Naming Rule



NO.	Meaning	Explanation of Parameter Values
1	Series Name	KT-LFPHV5.12-12
2	Energy Level	50-61： Rated Power 50kW Rated Energy 61kWh
3	Cooling Method	A: Air Cooling

2.2 Energy Storage Systems Overview

2.2.1 Systems Overview

This energy storage system adopts the form of one-piece outdoor cabinet, which integrates battery Pack, High Voltage (HV) control box, Hybrid inverter, Battery Management System (BMS), Energy Management System (EMS), Air Conditioning (AC), Power Distribution Unit, etc..

2.2.2 Working Principle

The system consists of 1 Pcs 50kW Hybrid inverter, 12 Pcs battery Pack in series and 1 Pcs HV box. The

main circuit of the HV box is mainly composed of circuit breaker, fuse, total positive contactor, total negative contactor, pre-charged contactor, pre-charged resistor, shunt, etc..

2.3 Energy Storage Cabinet Exterior View

Fig. 2-1 **KT-LFPHV5.12-12** -cooled Energy Storage Cabinet Exterior View

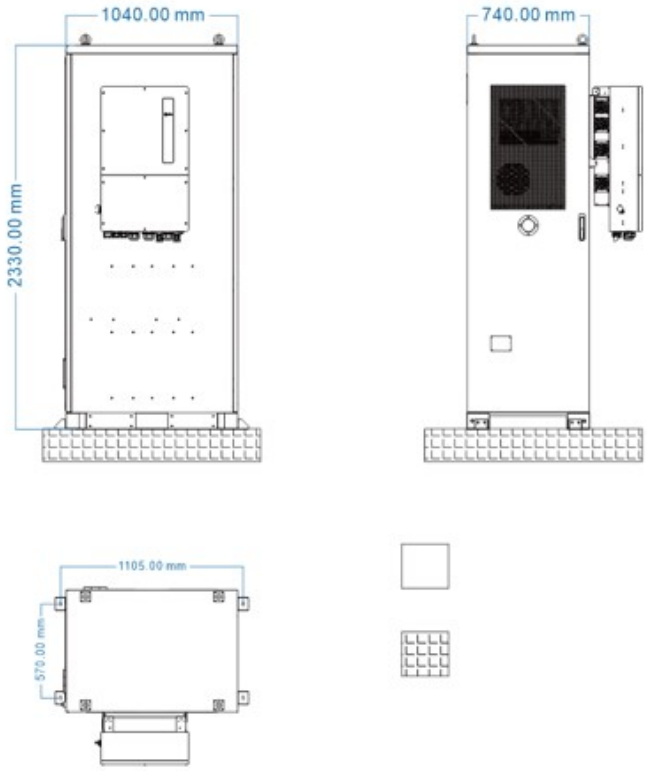


Fig. 2-2 **KT-LFPHV5.12-12** Air-cooled Energy Storage Cabinet Exterior View Dimension

2.4 Technical Parameters

No.	Items	Spec.	Remarks
		System Parameters	
1	Rated Power	50 kW	
2	Rated Energy	61.44 kWh	
3	Rated DC Voltage	614.4VDC	
4	System Voltage Range	480V～700.8VDC	
5	Operating Temperature Range	-30℃~+55℃	Derating below-15 ℃ or above 45 ℃
6	IP Level	IP55	
7	Corrosion Resistance	C4	
8	Dimension	740*1040*2330mm	
9	Weight	1200 kg	
		Pack Parameters	
10	Configuration	1P16S	
11	Rated Capacity	100 Ah	
12	Rated Voltage	51.2V	
13	Voltage Range	40V-58.4V	Battery cell 2.5V～3.65V
14	Rated Energy	5.12 kWh	
15	Charge /Discharge Current	≤1 P	
16	Altitude	3000 m	>2000m Derating
17	IP Level	IP20	
18	Dimension	590* 440*137mm	W*D*H
19	Weight	44±2 kg	
		PV Parameters (PV DC side)	
20	Recommended max. PV array size	100 kW	/
21	Max. usable PV input power	96 kW	/
22	Max. input voltage	1000 V	/
23	Rated voltage	600 V	/

24	Start-up voltage	180 V	/
25	MPPT voltage range	150 - 850 V	/
26	MPPT number / Max. input strings number	4 / 8	/
	AC Parameters		
27	Rated Output Power	50 kW	
28	Rated Grid Voltage	380V±15%	
29	Rated Current	76 A	
30	Rated Frequency	50 Hz/60 Hz±2.5 Hz	
31	Output THDI	<3%	
32	Power Factor	-1~1	
33	AC Output Type	3W+N+PE	
34	Charge/Discharge Conversion Time	<100 ms	
35	Maximum Efficiency	97.8%	
	HV Box Parameters		
36	Rated Voltage	1000 V	
37	Rated Current	100 A	
38	IP Level	IP20	
39	Dimension	440*590*147mm	W*D*H
40	Weight	22 kg	
	Other Parameters		
41	Fire Fighting System	Aerosol	
42	Altitude	3000 m	>2000m Derating
43	Noise	<75dB	
44	Environment Humidity	0~95℃,non-condensing	
45	Cooling Method	Air Cooling	

46	Environmental Requirement	ROHS
47	Communication Protocol	CAN/RS485
48	Design Service Life	6000 cycles (25 ± 2 ℃, 0.5P/0.5P,70% EOL,90%DOD /10 years, whichever comes first)
49	Compliance	UN38.3 、 UN3480 、 EN 62477-1、EN IEC 61000-6-2、EN IEC 61000-6-4

2.5 Main Components

2.5.1 ESS Cabinet

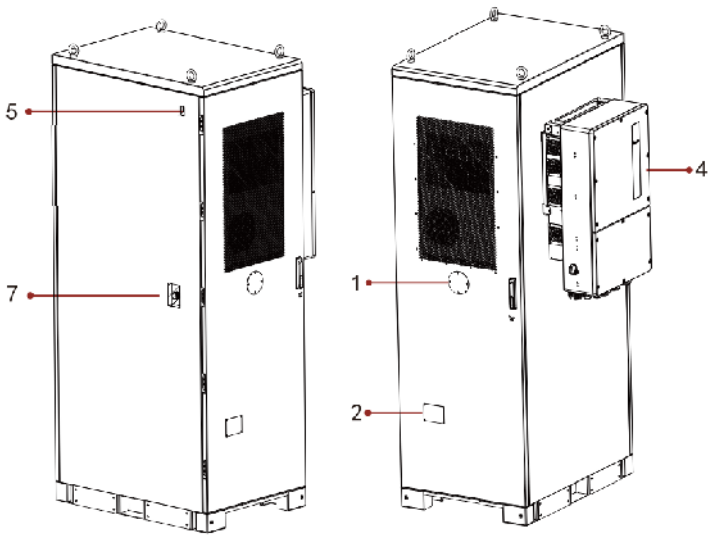


Fig. 2-3 Description of Cabinet Components (Closed State)

Table 2-1 Cabinet Front Door Components

No.	Components	Amounts	Remark
1	Emergency stop button	1	Press this button when the device is in emergency
2	Nameplate	1	Product information
3	Reserved	/	/
4	Hybrid PCS	1	
5	4G antenna outlet port	1	Using to report internal device temperature and smoke anomalies
6	Reserved	/	/
7	Water pipe connection	1	Fire breaks out, sprinkler starts cooling the battery pack

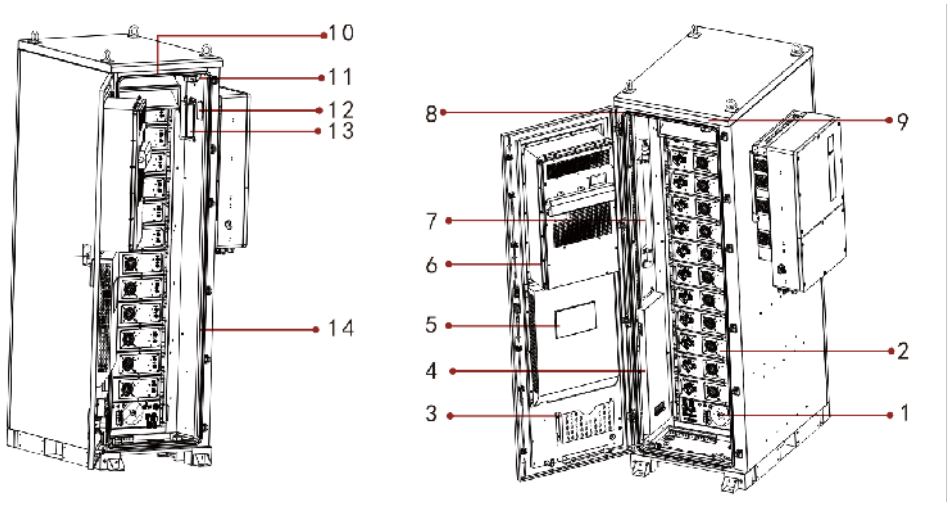


Fig. 2-4 Introduction to Cabinet Components (Open Door State)

Table 2-2 Cabinet Component Configuration

No.	Components	Amounts	Remark
1	HV Box	1	/
2	Battery pack	1	The battery pack is composed of 16 battery cells in series
3	File box	1	Deposit file
4	Secondary distribution unit	11	/
5	EMS display	1	/
6	Air conditioner	1	2kW/ Energy storage system cabinet door air conditioning
7	Water pipe	1	/
8	Temperature detector	1	For temperature detection
9	Entrance guard	1	Monitor the status of the door
10	LED tube	1	For cabinet lighting
11	Smoke detector	1	For smoke detection
12	Aerosol extinguishing device	1	1.69 M3
13	Cabinet	1	/

2.5.2 Battery Pack

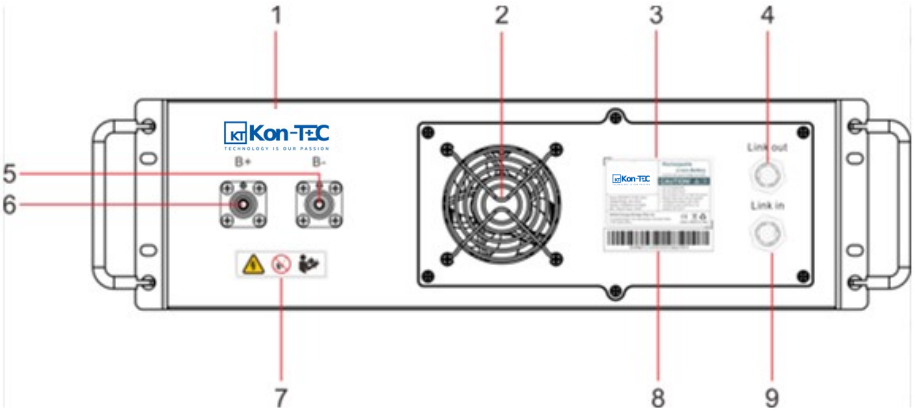


Fig. 2-5 Pack Panel Schematic diagram

Table 2-2 Device Description

No.	Description	Remark
1	LOGO	/
2	Fan	DC 24V fan
3	Nameplate sticker	/
4	Communication output port	/
5	Negative terminal	/
6	Positive terminal	/
7	Warning label	/
8	Serial number tag	/
9	Communication input port	/

2.5.3 High-Voltage Box

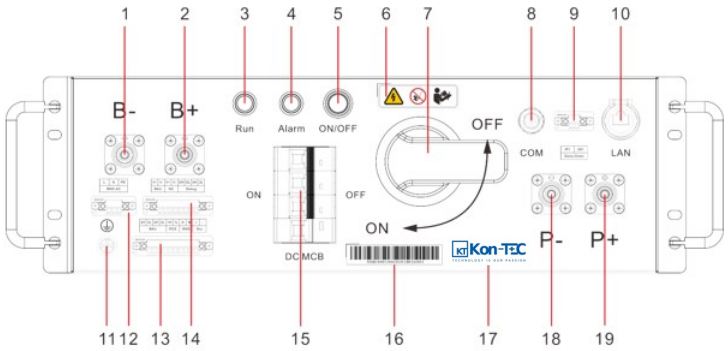


Fig. 2-6 HV Box Panel Schematic Diagram

Table 2-2 Device Description

NO.	Description	Remark
1	B-	Battery cluster -

2	B+	Battery cluster +
3	Run	Running light
4	Alarm	Warning light
5	ON/OFF	HV box power-on/off switch
6	Warning Label	/
7	Handle	HV box high voltage power switch
8	COM2	Communication interface with battery clusters
9	COM3	Communication interface with battery clusters
10	LAN	External network communication port
11	GND	/
12	COM1	AC power external port
13	COM5	External communications interface
14	COM4	Power output & debug port
15	DC MCB	DCDC power switch
16	Barcode	/
17	Logo	Supplier name
18	P-	PCS -
19	P+	PCS +

2.5.4 Air Conditioner

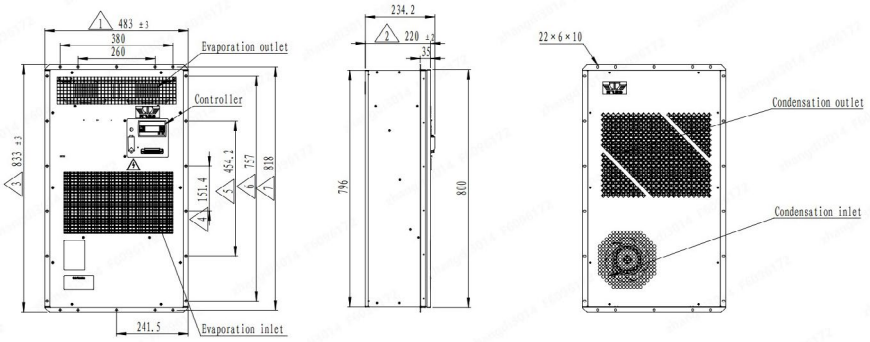


Fig. 2-7 Air Conditioner Diagrammatic Sketch

Table 2-3 Air Conditioning Technical Parameters

No.	Item	Spec.
1	Operation Temperature	-45~50 ℃
2	Rated AC input Power Supply	220VAC~50Hz/60Hz
3	Rated Cooling Capacity	2000 W
4	Rated Power (Cooling/Heating)	1000/1200 W
5	Rated Current (Cooling/Heating)	4.6/5.3A
6	Heating Power	1000 W
7	Air Quantity	900m^3/h
8	Weight	38 kg

9	IP Level	IP55
10	Refrigerating Fluid	R134a

2.5.4.1 Introduction of Air-conditioning Panel and Key Functions

The air conditioner enters standby loading after powering up, if there is no EMS communication strong control mode when set the parameters of the air conditioner through the panel.

Fig. 2-8 Display and Setting Board

Buttons	Function Descriptions
▲	To modify temperature parameter in setting mode.
▼	To check cabinet-in temperature, cabinet-in humidity, condensing temperature, defrosting temperature and setting temperature in working mode.
▲ ▼	Press and hold 3 sec. at the same time to enter the setting state, the digital tube blinks, 5 sec no operation automatically exit.
⚙	Long key press ⚙ for 3 sec can enter the parameter setting interface. setup mode is used to switch the parameter setting items.
⏻	Press ⏻ to turn on the power in standby mode, press ⏻ to turn off the power in power-on mode, and long press ⏻ for 3 sec to reset in faulty mode.

2.5.4.2 Display Instructions

The control board has three LED indicators for current chiller status and a four-digit, seven-segment LED digital tube display:

Name	Function Descriptions
Operation Indicator Light	Blinking: running
Cooling Indicator	Refrigeration compressor operating instructions
Alarm Indicator	Marking equipment is faulty and needs to be serviced
Display Window	Current ambient, defrosting and preset temperature are displayed, which can be switched by pressing "▲"or "▼".

As shown in the following Fig., after switching on the cooling unit, the software version is displayed for 2 sec., (i.e., "r1. 0" means software version is 1.0), followed by the setting state.

The controller has a 7-segment LED display, which can normally display the current ambient temperature after switching on the power supply, as shown below:

At this time, press the "▼" key, in the frost melting temperature and cabinet humidity, condensing temperature and preset temperature directly switch. The defrost temperature is shown below:

2.5.4.3 Modification Via Panel Parameters

After switching on the power supply, press "UP" and "DOWN" buttons simultaneously for 2 sec. to enter the password input interface, 【pd00】is displayed. Then press the "DOWN" to modify the value of the password to 1, press the "UP" to enter factory parameter setting state, password error will automatically exit (Password:1). The setting state automatically exits without operations for 5 sec., and ambient temperature is displayed. automatically, and display the temperature inside the cabinet.

2.5.6 Hybrid Inverter

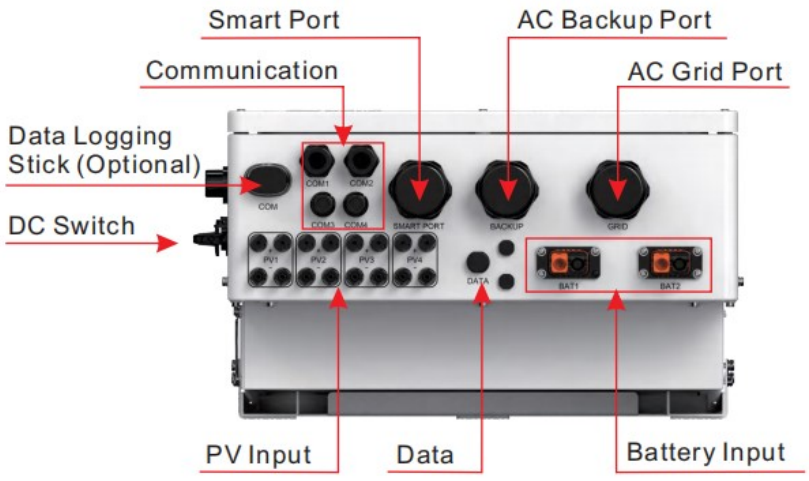


Fig. 2-9 PCS Panel Diagrammatic Sketch

Table 2-4 PCS Technical Parameters

No.	Symbol/Name	Function Description
1	DC Switch	This is the DC disconnect switch for the PV
2	COM	Solis data logger gets connected here-only USB version of the loggers will work
3	COM1	RS485 and CAN communication cables and parallel cables should go through these
4	COM2	RS485 and CAN communication cables and

		parallel cables should go through these
5	COM3	Communication cables for 14PIN terminal block should go through these
6	COM4	Communication cables for 14PIN terminal block should go through these
7	Smart Port	Conduit for AC conductors to generator should be connected here
8	Backup	Conduit for AC conductors to backup loads panel should be connected here
9	Grid	Conduit for AC conductors to the main service panel should be connected here
10	PV Module Input	Conduit for PV conductors should be connected here
11	Battery Connection	Conduit for Battery conductors should be connected here
12	DATA	Extends the range of the inverter GPRS signal

2.5.8 Local EMS/HMI

2.5.8.1 EMS Overview

EMS is responsible for monitoring and energy optimization scheduling of battery system BMS, converter system PCS, power distribution system, power l

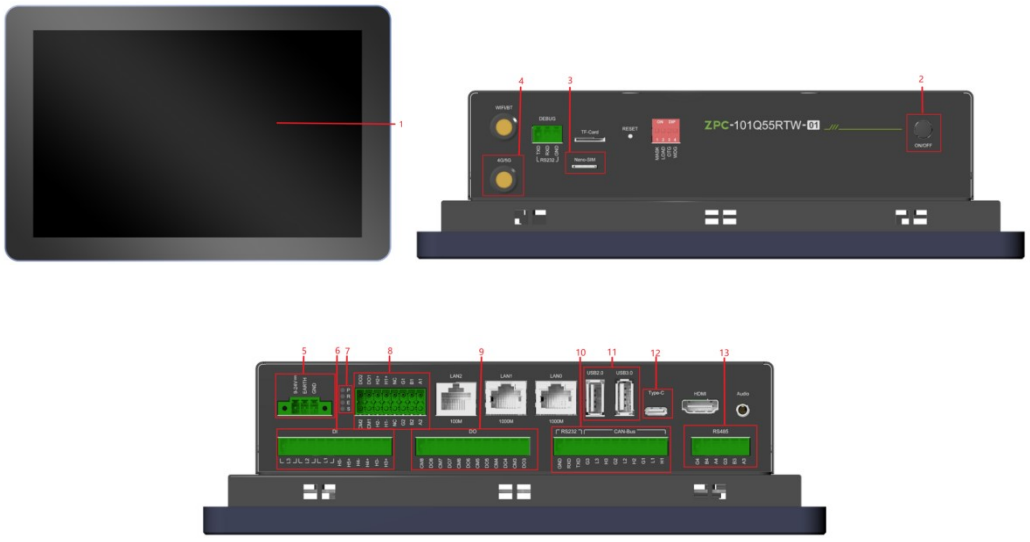


Fig. 2-10 EMS/HMI Schematic Diagram

2.5.9 Fire Suppression System

The energy storage cabinet fire protection system includes pack-level and cluster-level fire protection. Pack-level fire protection can provide early detection of fire sources at the root of the pack and rapid-fire extinguishing, while cluster-level fire protection can focus on the external fire sources of the system, preventing their spread and inhibiting their growth.

2.5.9.1 Cluster-level Fire Protection

Cluster-level fire protection system is fire extinguishing system .

2.5.9.2 Fire Safety System Components

Table 2-5 Fire Safety System Components

Item	Name	Quantity
1	Temperature detector	1
2	Smoke detector	1
3	Water firefighting system	1
4	Aerosol extinguisher	1

2.5.9.3 Fire hose systems

NOTICE

- Notice!:The internal temperature of the energy storage system reaches 68℃, the red thermal glass bulb on the fire extinguishing hose explodes, and water is sprayed to extinguish the fire and cool the energy storage system.
- It is recommended to install water pipes with an external diameter of DN 25.

Single Cabinet Installation: When installing a single cabinet, it is recommended to install an extension. First remove the plug above the cabinet, then connect the pagoda connector to the interface of the cabinet and connect it to the water source to complete the installation of the water pipe (the direction of installation is according to the customer's requirements).

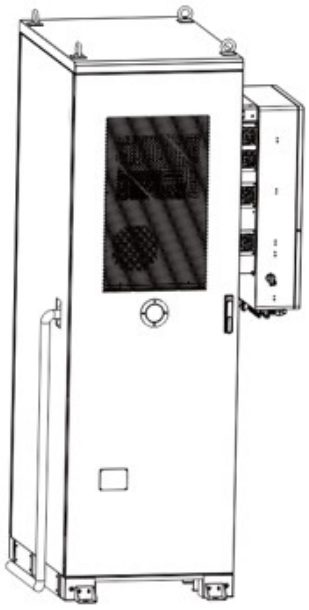


Fig. 2-11 Single Cabinet Plumbing Installation

Multi-cabinet installation: When installing multiple cabinets, it is recommended that extension tubes be installed. Then install the tee connector to connect to the neighboring cabinets. Finally connect the water pipe (water source direction according to customer's requirement).

3 Product Lifting, Transport, Storage

DANGER

• Prohibition of rough loading and unloading, as this may result in short-circuiting, damage, fire or explosion of the battery.

3.1 Hoisting Operation

3.1.1 Safety Precautions for Hoisting Operations

- Throughout the entire hoisting process, it is essential to strictly follow the safety operating procedures of the crane.
- Within a 10-meter radius of the operating area, no one is allowed to stand, especially under the crane arm and directly below any lifted or moving machinery, to prevent accidents and casualties.
- In case of adverse weather conditions, such as heavy rain, fog, or strong winds, hoisting operations should be halted.

3.1.2 Preparations Before Hoisting

- Crane Preparation： The total weight of the equipment (including packaging) is about 1.2 tons, please select the crane lifting tonnage according to the total weight of the equipment and the site conditions, recommended tonnage: 5 to 8 tons.
- Tool Preparation： Wire rope, buckles, brace, etc..

3.1.3 Hoisting Process

- The hoisting process must be carried out strictly in accordance with the hoisting diagram. For specific details, please refer to the attached Fig. 3-1 below.
- Lifting should be done vertically, and it is prohibited to drag on the ground or to push and drag across any surface.
- After the cabinet is lifted 300mm off the ground, the movement should be paused to inspect the connection of the lifting gear. Only after confirming that the connection is secure, then continue with the lifting process.
- Throughout the entire hoisting process, it should be carried out slowly, with careful observation of the box's balance. The movement must not be too fast.

Fig. 3-1 Lifting Schematic

3.2 Forklift Operation

When conducting forklift operations with a forklift, the following conditions must be met:

1. The forklift used should have adequate load capacity (it is recommended to have at least 5 tons).
2. When using a forklift for lifting operations, the fork should be fully inserted into the entire depth of the energy storage cabinet, with the fork length being no less than 1500mm. As shown in Fig. 3-2 below:

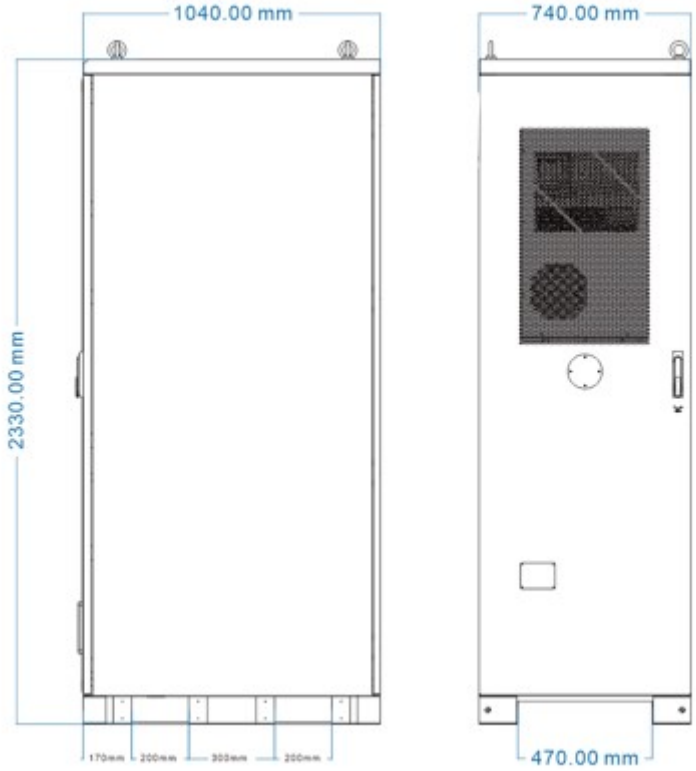


Fig. 3-2 Forklift Hole Diagram

3. During the movement, make sure that it is slow and smooth, and a test fork must be performed.
4. For safety considerations during forklift loading, it is recommended that a safety belt be tied around the energy storage cabinet and attached to the forklift crossbar. For specific forklift operations, refer to Fig. 3-3 below.

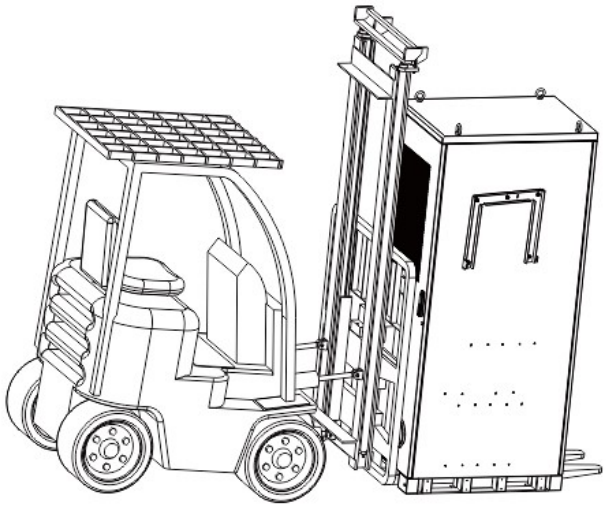


Fig. 3-3 Fork Diagram

- Always keep in mind the mechanical parameters of the energy storage system during transportation and handling
- Dimension (W*D*H):740*1040*2230mm
- Weight: about 1200kg

4 Equipment Installation

4.1 Installation Precautions

4.1.1 Installation Requirements

- Be careful not to touch the staff when the cabinet is lifted to the ground.
- Specialized installation isolation areas are required to perform installation operations.
- During the lifting process, pay more attention to the energy storage cabinets to be held lightly.
- Installation should only be carried out by installers trained in high voltage electrical handling.
- Do not install the energy storage cabinet if it is defective, cracked or damaged.
- Do not attempt to open, disassemble or modify the energy storage cabinet during installation.
- Do not install in inclement weather such as rain, sand, etc..
- To protect the Energy Storage Cabinet and its components from damage during transportation, do not hit, drag or step on the Energy Storage Cabinet, and do not subject the Energy Storage Cabinet to any strong external force.
- Do not insert foreign objects into any part of the energy storage cabinet.
- Do not expose the energy storage cabinet or its components directly to flames.
- Do not install energy storage cabinets near heating equipment.
- Do not immerse the Energy Storage Cabinet or its components in water or other liquids.
- Please place the energy storage cabinet on a level floor and make sure that it is placed smoothly without wobbling or tilting.
- The installation of energy storage cabinets should take into account the bearing and loading capacity of the ground on which they are installed.

4.2 Pre-installation

4.2.1 Installation Environmental Requirements

Considering the space requirements of the energy storage battery storage cabinet, the specific installation distance is based on the requirements of local design and installation specifications.

> ⚠ NOTICE
>
> - The maintenance space of the front door of the cabinet is required to be not less than 1.5m (if a forklift is needed to replace the pack, it is recommended to reserve 2.5m.
> - The maintenance space on the left and right sides is required to be not less than 0.2m.
> - The maintenance space of the back door of the cabinet is required to be not less than 0.2m.
> - Environment Humidity:0~95 ℃. non-condensing.
> - Altitude: 3000m (>2000m derating).

4.2.1.1 Installation Project Site Requirements

Refer to Fig. 4-1 below for a diagram of the minimum dimensions for the installation and operation and maintenance of energy storage cabinets:

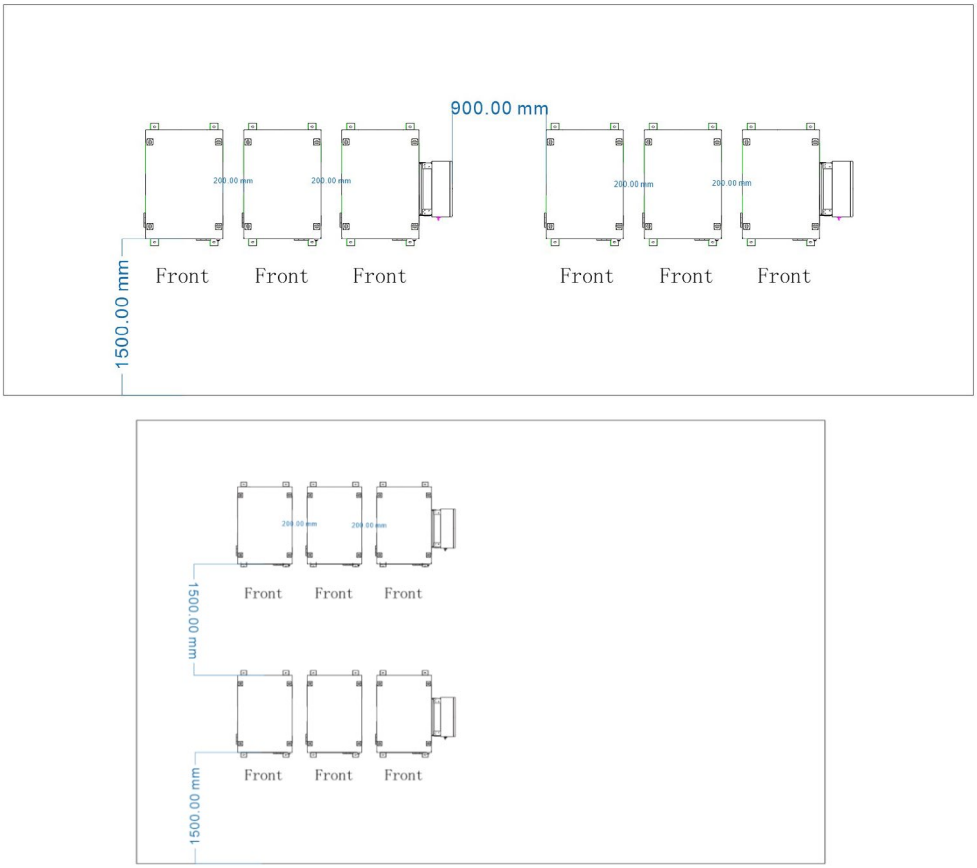


Fig. 4-1 Installation Site Requirements

4.2.1.2 Foundation requirements

1. The installation level should be higher than the highest water level in the history of the area and at least 200mm higher than the horizontal ground, and the installation position should not be in low-lying areas. The installation site should have a dry climate, good ventilation, and be located away

from areas prone to fire or explosion hazards.

2. The energy storage cabinet must be mounted on concrete or other non-combustible surfaces, and the mounting plane must be level, firm, and flat, with sufficient bearing capacity to prohibit depressions or tilting.

3. The foundation soil needs to have a certain degree of compactness, and it is recommended that the relative density of the soil at the installation site is not less than 98%. If the soil is loose, corresponding measures must be taken to ensure the stability of the foundation. The equipment foundation is configured according to the total weight of the equipment, if the foundation capacity is not satisfied, it needs to be reviewed.

4. Equipment foundation excavation is strictly prohibited after soaking water disturbance, if soaking water disturbance should continue to excavate and replace the fill.

5. Equipment foundation and cabinet contact surface level error less 3m.

6. Construction of drainage facilities in conjunction with local geology and municipal supporting drainage requirements to ensure that water does not accumulate at the foundation of the equipment. foundation construction should meet the local historical maximum rainfall drainage requirements, and the discharged water needs to be treated in accordance with local laws and regulations.

7. When constructing the equipment foundation, it's important to consider the energy storage cabinet cable outlet and reserve a trench or inlet hole. The trench must incorporate necessary waterproof and moisture-proof designs to prevent cable aging and short circuits, which could affect the normal operation of the energy storage equipment. Due to the high power of the equipment and the correspondingly thick cables required, the design of the trench must take into account the cross-sectional area of the cables adequately.

8. The holes reserved for the foundation of the equipment and the holes for the inlet lines at the bottom of the equipment shall be blocked.

9. Customers can determine the number of cables supports based on their needs, and the cable supports must fully consider the weight and size of the equipment. When laying cables, communication lines, power lines, and power cables need to be laid separately. Direct current circuits and alternating current circuits should be laid separately, and the distance between different cables should be greater than 300mm.

10. Site Location Requirements. The area where the equipment is placed should be firm, level, well drained, and free of obstructions or protrusions.

4.2.2 Equipment Ventilation Requirements

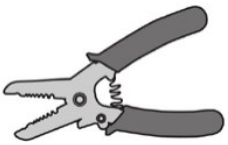
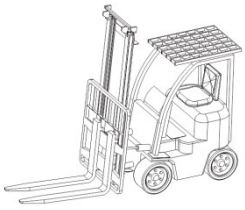
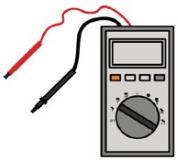
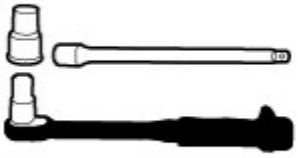
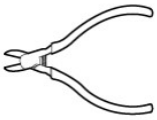
The operation of energy storage equipment generates a large amount of heat, and high equipment temperatures can cause deterioration of the electrical parameters of the energy storage equipment and may cause damage to the energy storage equipment. To ensure the heat dissipation of the energy storage device, the installation environment must meet the following requirements:

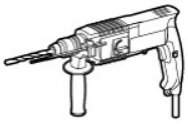
1. The equipment should be installed in a well-ventilated environment.
2. The air inlet must ensure that enough fresh air enters into enters.
3. The ventilation system for the equipment is recommended to be separate from the rest of the ventilation system in the control room.
4. If the equipment overheats, check whether the air vents are properly ventilated.

4.2.3 Installation Tool Preparation

Table 4-1 Tool Preparation

Tool	Quantity	Illustrative Diagram

Wire Stripper	1	
Electric Forklift Truck	1	
Multimeter	1	
Torque Wrench	1	
Insulated Socket Wrench	1	
Tweezers	1	
Heat Gun	1	
Hand Forklift	1	

Pneumatic Drill	1	
Art Knife	1	
Safety Gloves	1	
Protective Glasses	1	
Insulating Shoes	1	
Safety Helmet	1	

4.2.4 Pre-installation Inspection

Table 4-2 Inspection Items

No.	Inspection items
1	Check that the packing boxes are not missing, damaged, or damp
2	After unpacking, please check the shell of each module without deformation, paint loss, rupture and other abnormalities, and no water damage and other abnormalities in the shell.
3	Please check the contents of the box for accessories and count the items according to the list to ensure that they are complete (optional).

4.3 Energy Storage System Structure Installation

4.3.1 Cabinet Package Removing & Installation

Step 1: Remove the outer box packaging

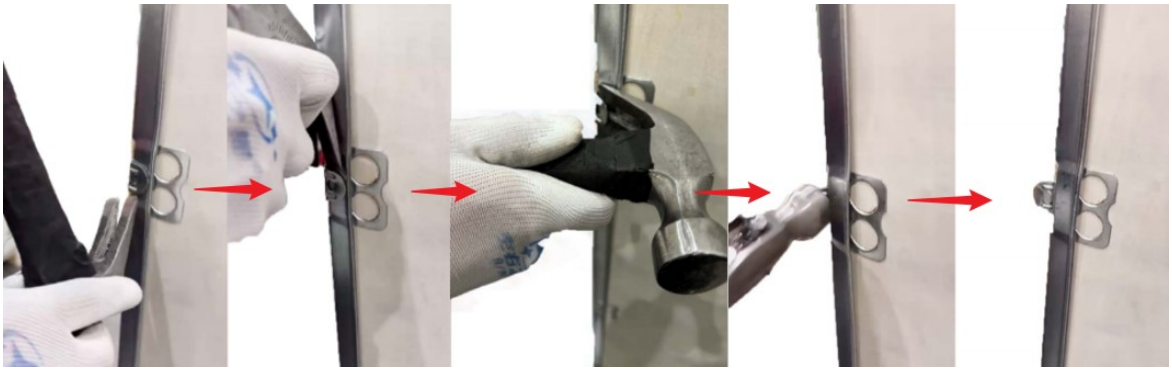


Fig. 4-2 Schematic Diagram of the Removal of the Wooden Box

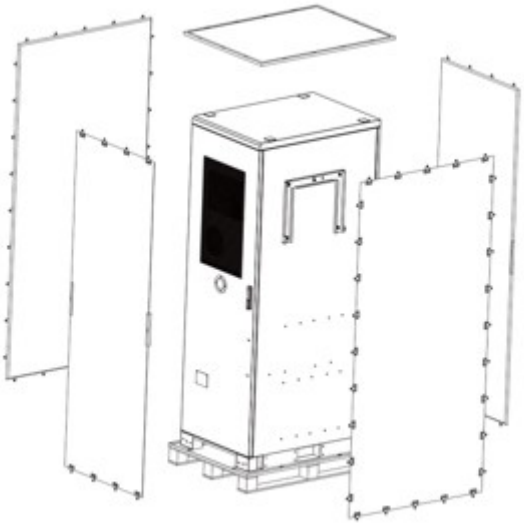


Fig. 4-3 Removing around Box Graph

Step 2: Remove the pallet by removing the bolts connecting the energy storage system to the pallet with an adjustable wrench or socket wrench

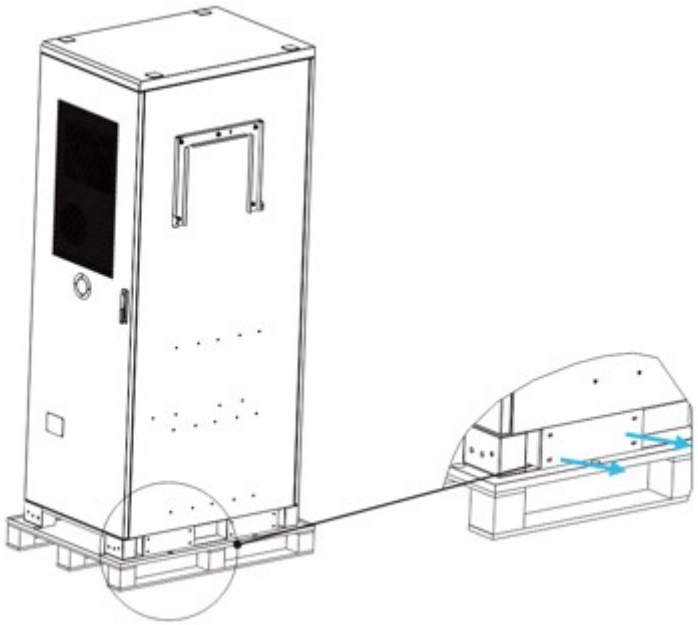


Fig. 4-4 Partial Screw Removal Diagram

Step 3: Remove the sealing plate of the cabinet base, use a Phillips screwdriver to remove the sealing plate of the base

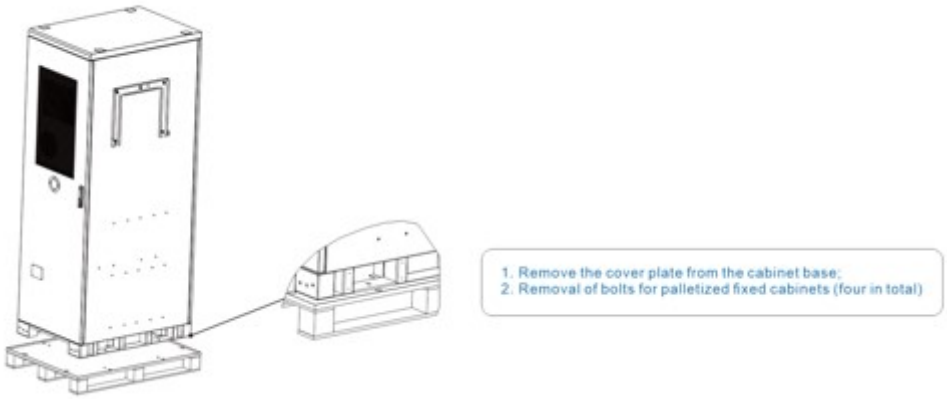


Fig. 4-5 Removing the Sealing Plate Schematic

Step 4: Open the cabinet door

Step 5: Pick up the information for the file box, such as packing list, etc..

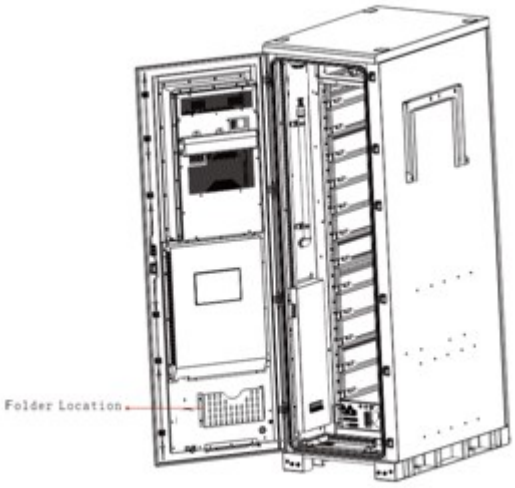


Fig. 4-6 Opening door Schematic

Step 6: Take out the installation parts supplied with the box, after opening the door, please check the delivery parts and quantity supplied with the box according to the "packing list". As following table:

Table 4- 3 Inspection items

Name	Description	Quantity	Illustrative Diagram
Power line 1	Power C1	1	
Power line 2	Power C3	11	
Power Line 2	Power C2	1	
Communication line1	COM1	1	
Communication line2	COM2	11	
Communication line3	COM3	1	
Chassis Mount	/	4	

Windscreen	/	1	
Expansion Bolt	M12*120	4	
Eyebolt	M16	4	
Assembling Bolt	M6*16	48	
Assembling Bolt	M4*12	15	
Assembling Bolt	M10*20	8	
Pagoda Fitting	DN25	1	
Throat hoop	DN25	1	
Pan head screw	M6*12	18	
Bellows fixings	AD18.5	18	
Cable Tie	3*150mm	100	/

Step 7: After closing the cabinet door, move the energy storage cabinet to the designated installation location. When using a forklift to move the equipment, please tie down and fix it according to the actual situation to ensure that there is no risk of tipping over. When using a hoist to move the equipment, use a nylon sling (strap) or wire rope

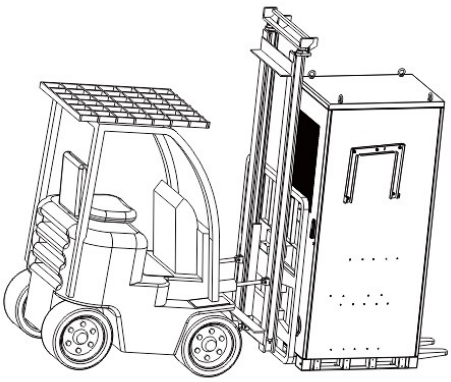


Fig. 4-7 Transportation Schematic

Step 8: Fixing the energy storage system

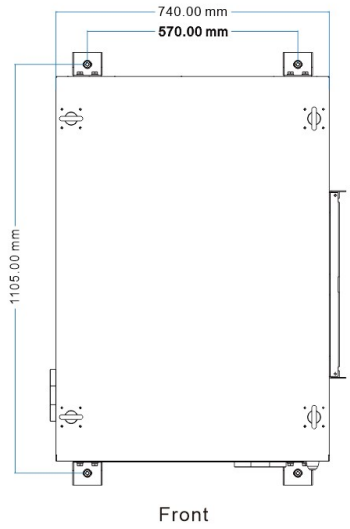


Fig. 4-8 Fixing Schematic

Step 9: Fixed energy storage systems： First of all, take 4PCS Chassis Mount and install it to the front and rear of the cabinet's base, and lock it with 2PCS M10*20 respectively, using a torque of not less than 30N.m. and then use expansion bolts M12*120 to fix the cabinet on the ground as a whole.

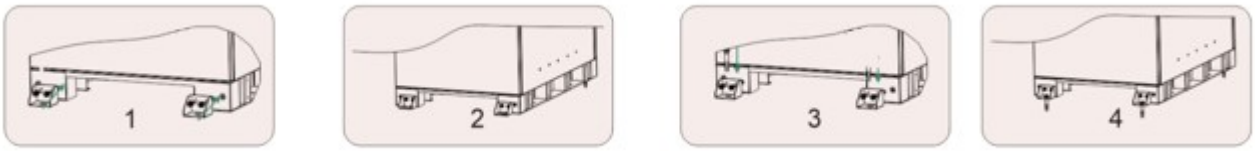


Fig. 4-9 Support Installation

Step 10: Take out four base fixing seats and secure them to the cabinet base using eight M10 bolt assemblies.

Step 11: Take out four M12 expansion bolts to secure the cabinet to the foundation.

4.3.2 Pack Installation in Cabinet

1. Pre-installation Inspection

> ⚠ NOTICE
>
> • Please make sure that the installed battery Pack is intact.
> • Before installation, please consult the information on installing the battery Pack, and familiarize with and comply with its installation requirements and precautions.

2.Procedure

Step 1: Open the battery pack wooden box

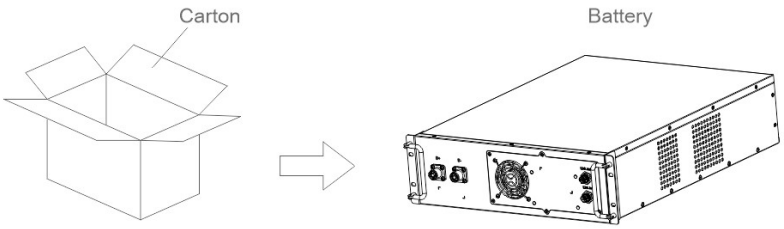


Fig. 4-10 Open Carton Structure Schematic

Battery packs are installed into the ESS, install the battery packs according to the following sequencing table, use M6*16 combination screws and socket wrenches to fasten them, the installation torque is 5N.m.

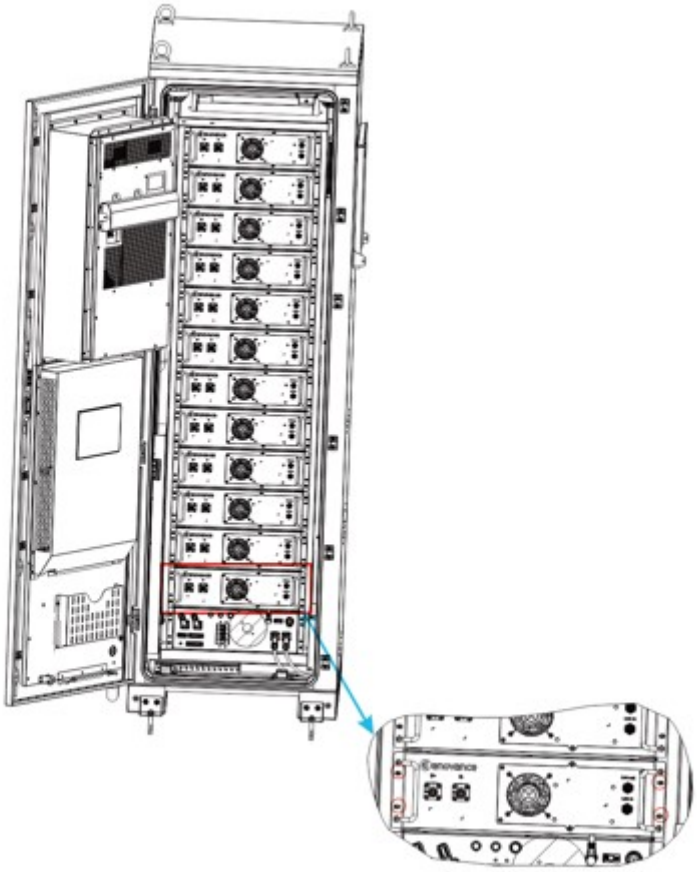


Fig. 4-11 Battery Packs Mounted to ESS

Step 2: Installation of the battery pack to the ESS: Install the battery pack to the position as shown above, take the M6 screws and use a socket wrench to lock them, the installation torque is 5N.m.

Step 3: Mount the air guide to the cabinet and fix it with 7PCS M4*12 combination screws.

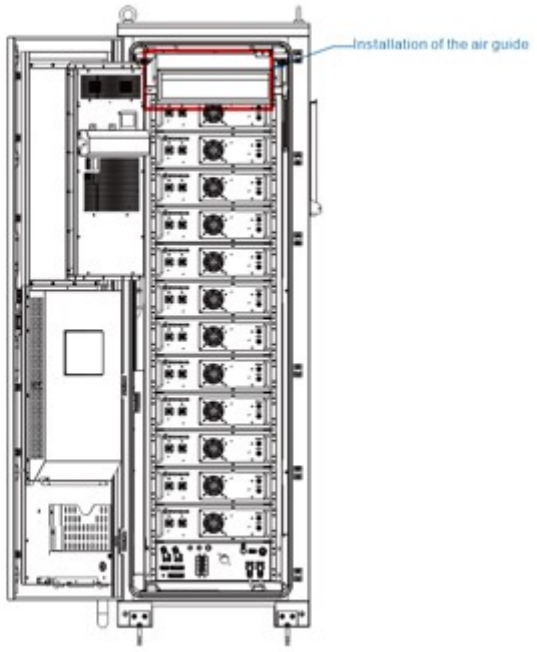


Fig. 4-12 Reinstall The Removed Air Hood Schematic

4.3.3 Inverter Installation

4.3.3.1 Inspection of packaging materials

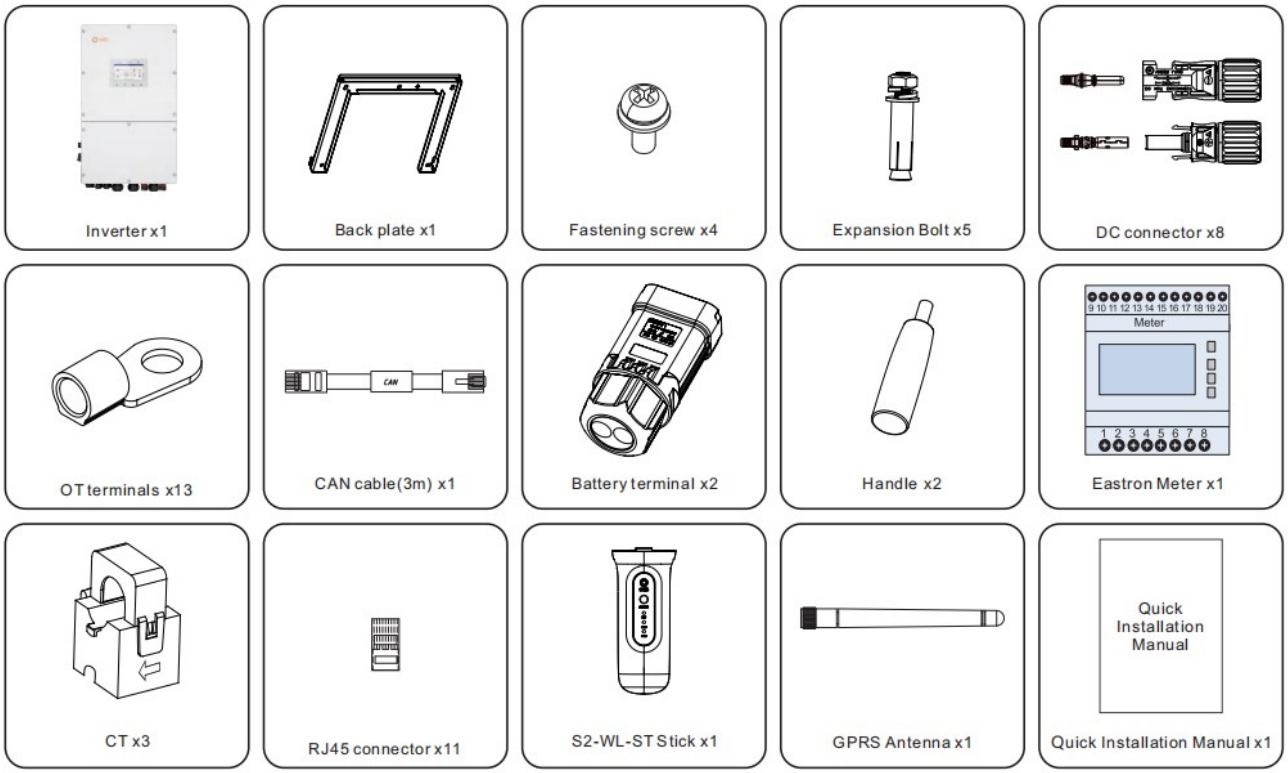


Fig. 4-13 Unpacking the Inverter

4.3.3.2 Tools Required for Installation

Fig. 4-14 Installation Tools

4.3.3.3 Installation Instructions

When choosing the location for an inverter, the following criteria should be considered:

1. Exposure to direct sunlight may cause output power derating due to overheating;
2. It is recommended to avoid installing the inverter in direct sunlight. The ideal location is one where the ambient temperature does not exceed 40°C;
3. It is also recommended to install the inverter somewhere the rain and snow will not land directly on it. The ideal installation location is on a north-facing wall under an eave.

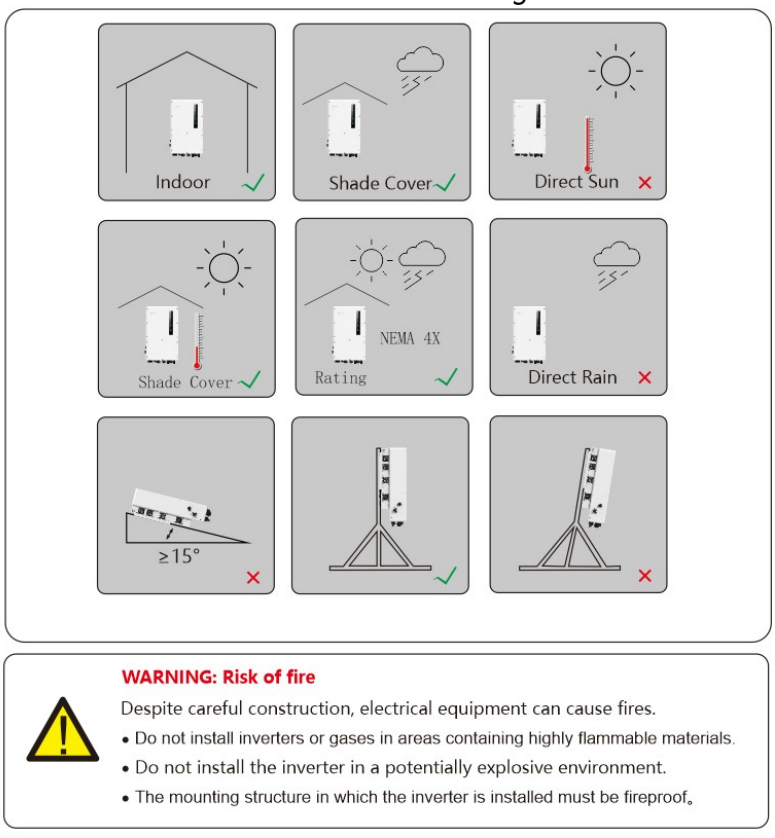


Fig. 4-15 Installation Environment

When selecting the location for the inverter, please consider the following factors:

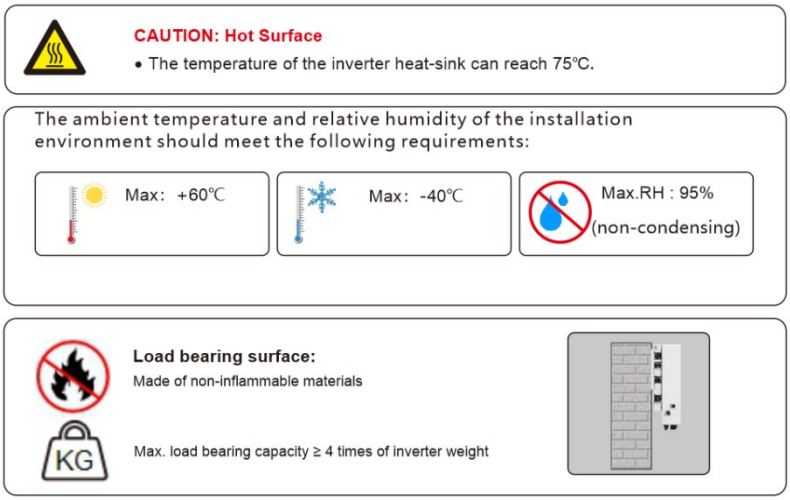


Fig. 4-16 Installation Requirements

1. If multiple inverters are installed on site, a minimum clearance of 500mm should be kept between each inverter and all other mounted equipment. The bottom of the inverter should be at least 1000mm above of the ground or floor.
2. The LED status indicator lights located on the inverter's front panel should not be blocked.
3. Adequate ventilation must be present if the inverter is to be installed in a confined space.

4.3.3.4 Mounting the Inverter

Mount the inverter on a wall or structure capable of bearing the weight of the machine.The inverter must be mounted vertically with a maximum incline of +/- 5 degree. Exceeding this may cause the output power to derate.

To avoid overheating, always make sure the flow of air around the inverter is not blocked. A minimum clearance of 500mm should be kept between inverters or objects and 1000mm clearance between the bottom of the machine and the ground.

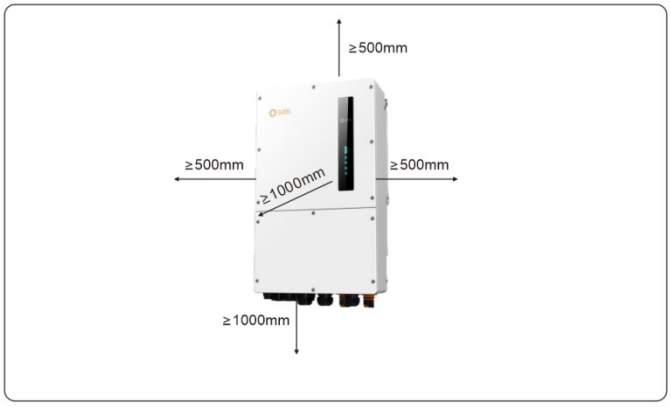


Fig. 4-17 Inverter Mounting Clearance

Visibility of the LED indicator lights should be considered.

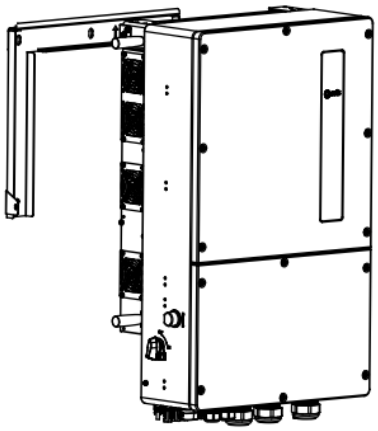
Adequate ventilation around the inverter must be provided.

NOTE

Nothing should be stored on the top of or placed against the inverter.

Lift the inverter (taking care to avoid body stress) and align the rear bracket of the inverter with the

convex part of the mounting bracket. Hang the inverter on the mounting bracket, making sure that the inverter is stable（see Fig.4-18）.



WARNING:

The inverter must be mounted vertically。

Fig. 4-18 Lift the Inverter

Lock both ends of the inverter with M5*12 combination screws to secure the inverter（see Fig.4-19）.

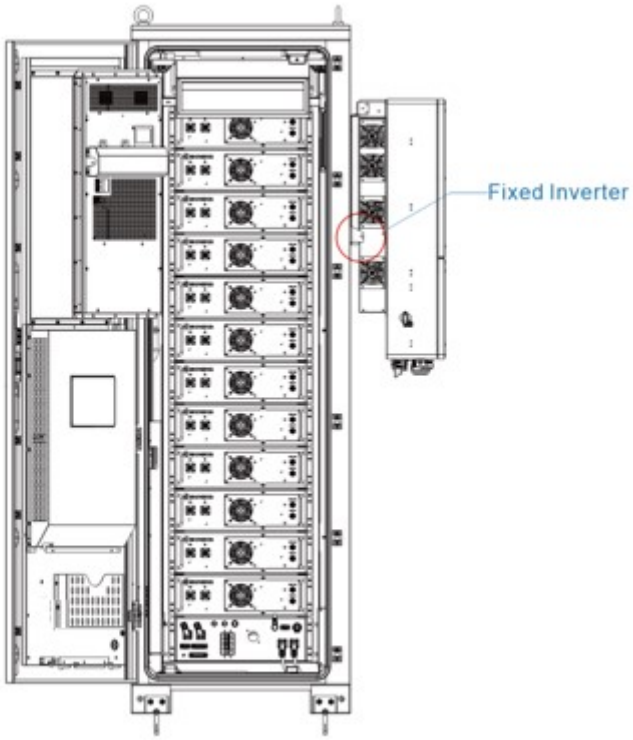


Fig. 4-19 Fixed Inverter

4.3.4 Structure Safety Check

Table 4-4 Safety Check

No.	Inspection Items	Treatment Measures
1	Fasteners are tightened or not	If loose, tighten the screws again
2	Whether the space environment meets the installation size requirements	If space is insufficient, it is recommended to redesign and reinstall
3	Are the air ducts clear and free of foreign objects	If there is a foreign body, please deal with it, if it does not flow smoothly to rule out the causes

4.4 Energy Storage System Electrical Connection

4.4.1 Overview of Electrical Connections

1. All electrical connections must be made in strict accordance with the wiring diagrams.
2. All electrical connections must be made with the equipment completely de-energized.

4.4.1.1 Preparation before connection

The internal work of the energy storage cabinet has been completed before delivery except for the wiring between battery packs, the user only needs to connect the inter-cabinet cable and external wiring can be, the AC terminal is mainly located in the lower right side of the energy storage cabinet, the ground terminal is located in the bottom of the energy storage cabinet.

4.4.2 Energy Storage System Interface Description

Table 4-5 Wiring Harness List

Name	Quantity	Illustrative Diagram
Power Harness 1	11	
Power Harness 2	1	
Communication Harness 1	1	
Communication Harness 2	11	

Step1: Take 11 PCS Power Harness 1 and plug it into the battery pack's 2 ends, as shown in Figure 4-21, the cables should be installed in place, and a "click" will be heard that the installation is in place.

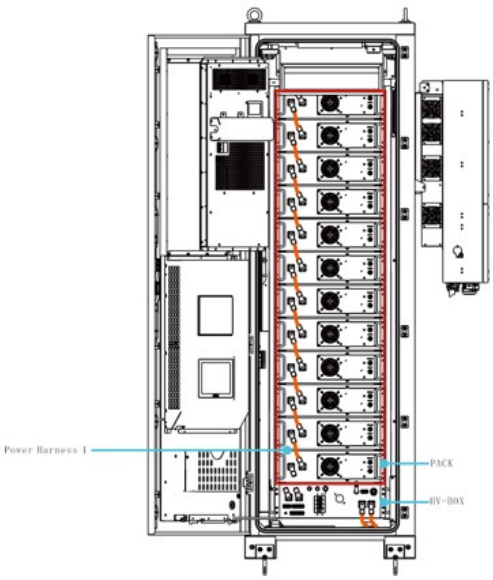


Fig. 4-20 Installation of Power Harness 1

Step2: Take 1PCS of Power Harness 2 and connect it to the battery pack and HV box as shown in Figure 4-22, the cables need to be installed in place, when you hear a “click”, it will be installed in place.

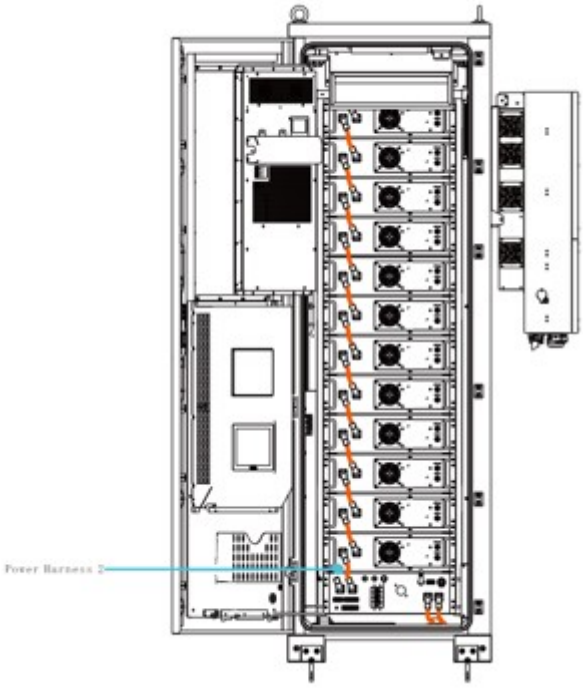


Fig. 4- 21 Installation of Power Harness 2

Step3： Connect the cables tied inside the cabinet to the battery pack as shown in Fig.4-23. The cables need to be installed in place, and a “click” is heard when they are in place.

Step4： Installing the communication harness: you will install the communication harness 1, communication harness 2 respectively to the position in Figure 4-24, and at the same time, cut the ties of the communication harness on the left side of the cabinet and connect the harness to the battery

pack.

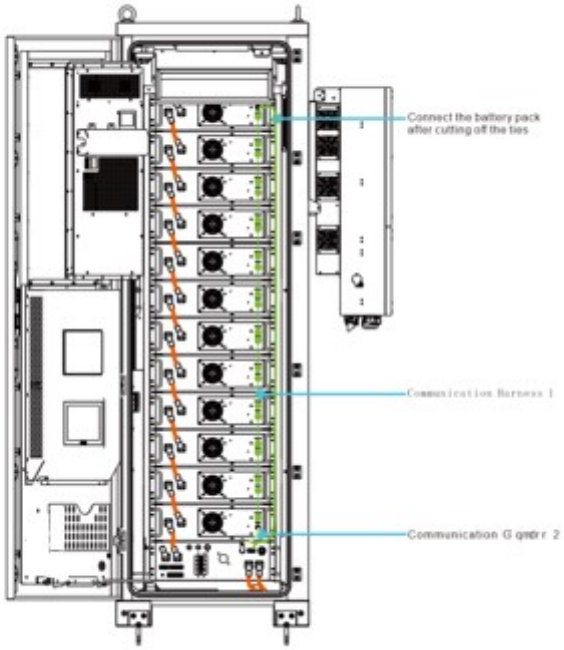


Fig. 4-22 Connection Harnesses

4.4.3 Cable Connection of the Inverter to the ESS

To connect the 2-way battery harness from the energy storage system to the inverter, please open the cabinet door and connect according to the following figure
BAT-Copper row connecting inverter BAT1 -and BAT2 -, BAT+ Copper row connecting inverters BAT1+ and BAT2+.
Step 1: Remove the wire end battery terminals from the attachment package, insert the positive and negative battery cables from the rear end of the battery terminal and pass them through the nut and the waterproof ring. According to polarity, insert the positive and negative cables separately into the wiring holes of the board-side battery terminal. Observe the transparent hole, the cable is in place, use a screwdriver to tighten the screw. The torque is 1.2±0.1N.M.
Step 2: Insert the wire end terminal onto the board end terminal until you hear a "click", ensuring the terminal lock is securely in place.

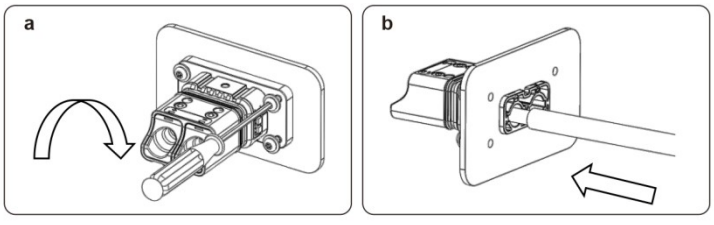


Fig. 4-23 Locking Power Terminal

Step 3: Press the wiring with T8 Torx screwdriver with torque of 1.2±0.1N.M.
Step 4: Thread the stripped wire into the lock nut and the main body in turn (the flexible wire needs to be riveted to the insulated terminal).
Step 5: Installation completed.

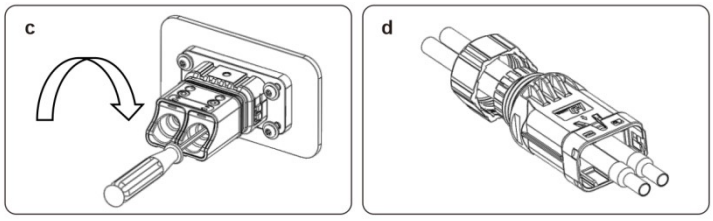


Fig. 4-24 Tighten connectors

Step 6: Insert the cable into the rubber core according to the line sequence, observe the perspective hole, the cable is in place, and the torque of the crimping screwdriver is 4 ± 0.1N. M.
Step 7: Insert the main body into the rubber core and hear the "click" sound.

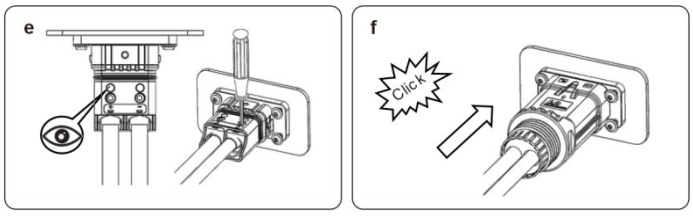


Fig. 4-25 Tighten the Harness

Step 8: Tighten the nut with an open-ended wrench(torque10.0±0.1N·m).
Step 9: Complete the installation.

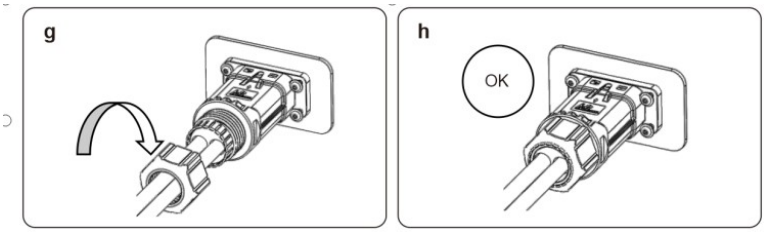


Fig. 4-26 Tighten the Nut

A. Hold the body with one hand and turn the nut in the opposite direction with the other.
B. Use a screwdriver to align the unlocking position, press and hold the main body and pull back to complete the removal.

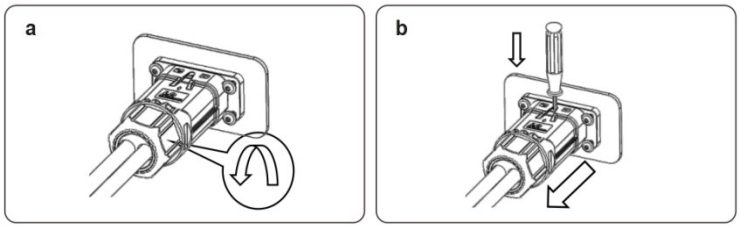


Fig. 4-27 Loosen the Nut

4.4.4 Wiring Description Sheet

Connect cables requirements between battery packs in the energy storage cabinet, as shown in the following Table 4-6

Table 4-6 Wiring Description Sheet

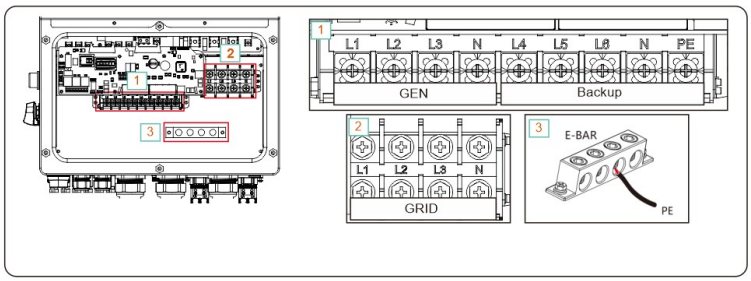
No	Name	Cable Specifications	Terminal Specifications	Clarification

1	A Phase	50 mm^2(1/0 AWG)	M10(OT terminal)	Connecting cables between the system and the external power grid(28.2 N.m)
2	B Phase	50 mm^2(1/0 AWG)	M10(OT terminal)	Connecting cables between the system and the external power grid(28.2 N.m)
3	C Phase	50 mm^2(1/0 AWG)	M10(OT terminal)	Connecting cables between the system and the external power grid(28.2 N.m)
4	N Phase	25 mm^2(4 AWG)	M6(OT terminal)	Ground to the closest neutral bar(20.3 N.m)
5	PE	25 mm^2(4 AWG)	M6(OT terminal)	Connect to the nearest ground bar(20.3 N.m)

4.5 AC Wiring

4.5.1 AC Wiring Connection and Procedure

1. Before installing the AC cables, be sure that the OCPDs (breakers) are turned off. Use a multimeter to verify that the AC voltages are 0Vac before proceeding.
2. Use a wire stripper to strip the corresponding specification ground wire to expose a bare copper core, and the length of the bare copper core should be 3mm longer than the OT terminal connection end.
3. Use a crimping tool to crimp the OT terminal onto the bare copper core.
4. Slide a heat-shrink tube of the appropriate size onto the wiring end of the OT terminal, and the length of the heat-shrink tube (with a voltage rating of at least 1000V) should be 1.5 to 2 times the length of the wiring end.
5. Use a heat gun to shrink the heat-shrink tube tightly, ensuring it grips the terminal and the cable securely, thus completing the cable assembly.
6. Secure the prepared cable at its interface with the corresponding screws (use M10 screws for phases A, B, and C, and M6 screws for phase N and PE).
7. Wiring complete: There are three sets of AC output terminals and the installation steps for both are the same.



Model	AC Gen/AC Backup/AC Grid
Wire Size	4/0 AWG
Torque	28.2N.m
Cable	35 mm2

Fig. 4-28 AC Output Terminals

8. Bring the AC cables for the backup loads panel (backup) and the main service panel (grid) into the inverter wire box. The backup loads panel should not be electrically connected to the main service panel.
9. Strip 13mm from the ends of each cable. Crimp the R-type connectors onto the ends.
10. Remove the terminal bolts, insert them into the connectors, then use a torque wrench o tighten the bolts down.
11. Please refer to the terminal labels to connect the AC wires to the correct terminals.

4.5.2 Meter/CT Connection

4.5.2.1Meter Installation

The Solis S6-EH3P(29.9-50)K-H Series inverters are able to connected standard Eastron meters to fulfill the control logic of the self-consumption mode, export power control, monitoring, etc.
Eastron 3ph meter (With CT): SDM630MCT V2 (Provided by default).

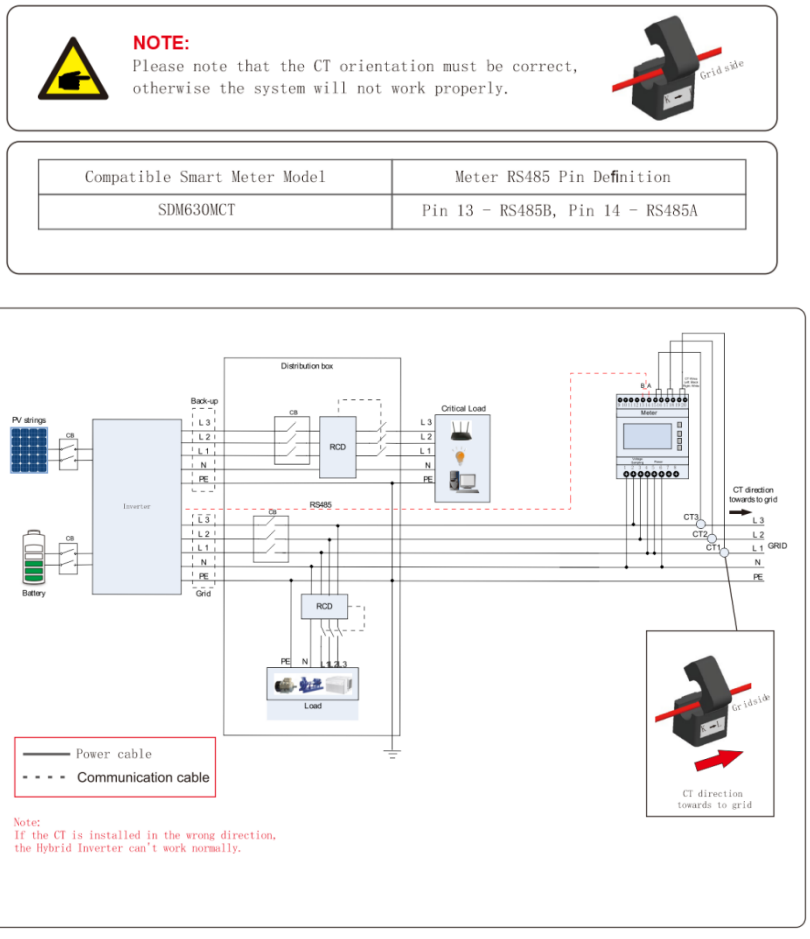


Fig. 4-29 Eastron SD M630M CT

4.5.2.2 CT Installation

The CT provided in the product box is compulsory for hybrid system installation. It can be used to detect the grid current direction and provide the system operating condition to hybrid inverter.
CT Model: ESCT-T50-300A/5A
CT Cable: Size – 2.3mm2, Length - 3m
Please install the CT on the hot line at the system grid connection point and the arrow on the CT needs to point to the grid direction.

Lead the CT wires through the COM3 port at the bottom of the inverter and connect the CT wires to the 14pin communication terminal block.

White	Pin 1 (From Left to Right)
Black	Pin 2 (From Left to Right)
White	Pin 3 (From Left to Right)
Black	Pin 4 (From Left to Right)
White	Pin 5 (From Left to Right)
Black	Pin 6 (From Left to Right)
White	Pin 1 (From Left to Right)
Black	Pin 2 (From Left to Right)

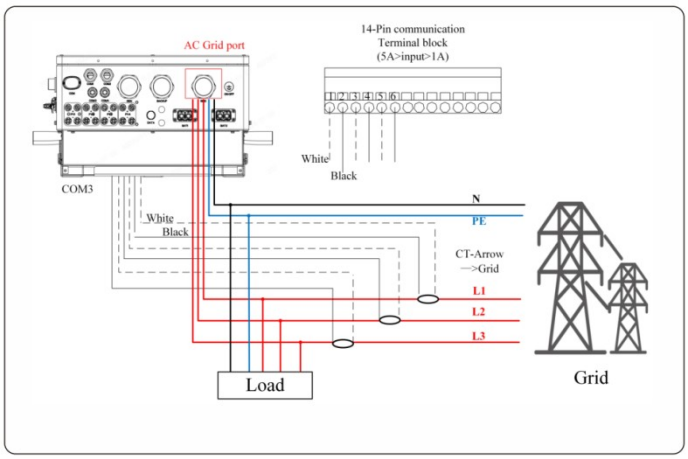
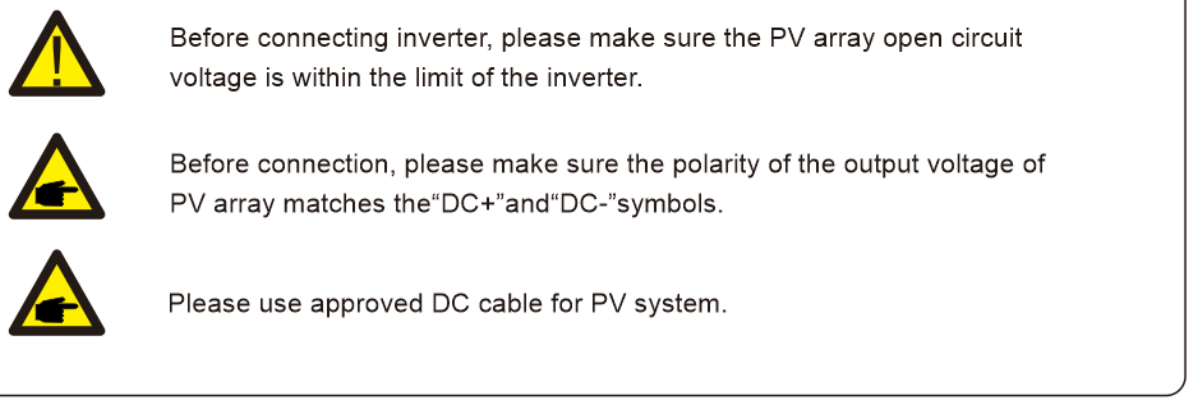


Fig. 4-30 Installation Position

4.5.2.3 Checking the Equipment After Wiring

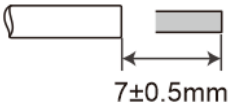
After completing the wiring, it's necessarily to carefully check whether the phase sequence and the silkscreen correspond to each other, and whether the wiring of the zero row and the ground row is correct.

The connection diagram is as follows:



4.5.2.4 PV Cable Installation

Step 1: Select a suitable DC cable and strip the wires out by 7±0.5mm. Please refer to the table below for specific specifications.



Cable type	Cross section（mm²）	
	Range	Recommended value
Industry generic PV cable	4.0~6.0 (12~10AWG)	4.0（12AWG）

Fig. 4-31 Wire Stripping Requirements

Step 2: Take the DC terminal out of the accessory bag, turn the screw cap to disassemble it, and take out the waterproof rubber ring.

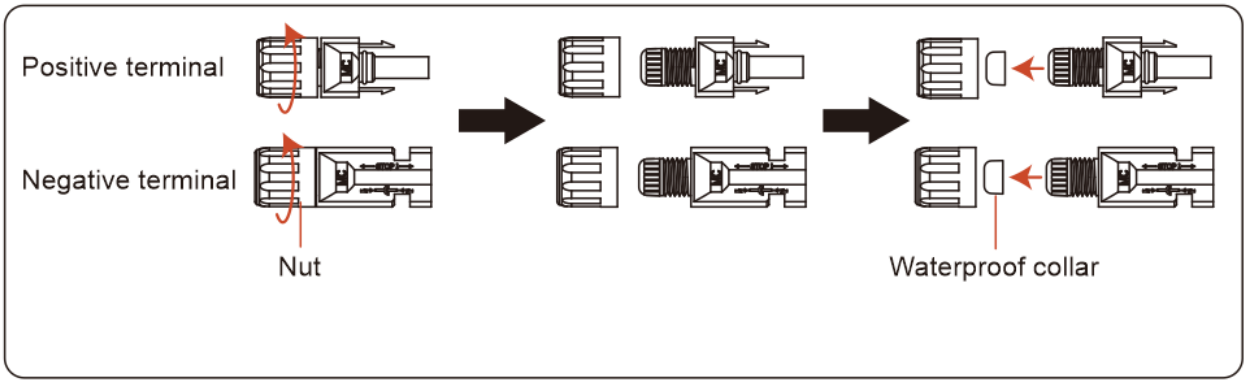


Fig. 4-32 PV Connector Installation

Step 3: Pass the stripped DC cable through the nut and waterproof rubber ring.

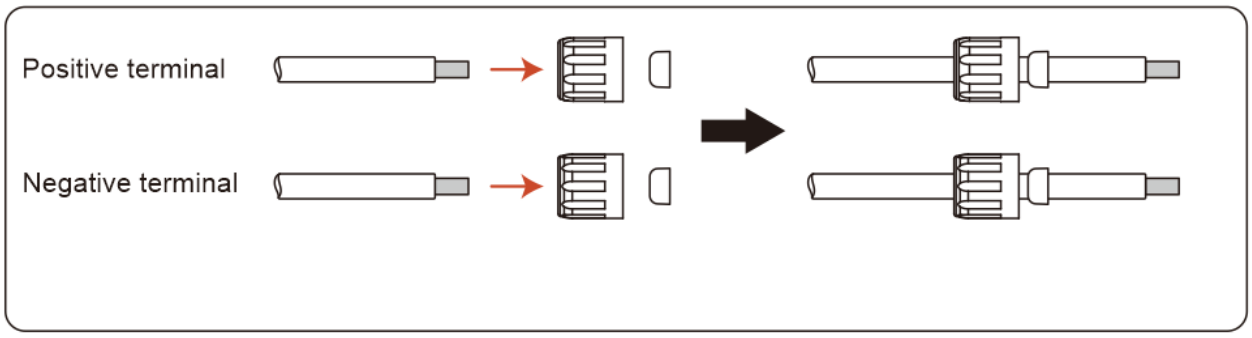


Fig. 4-33 DC Cable Installation

Step 4: Connect the wire part of the DC cable to the metal DC terminal and crimp it with a special DC terminal crimping tool.

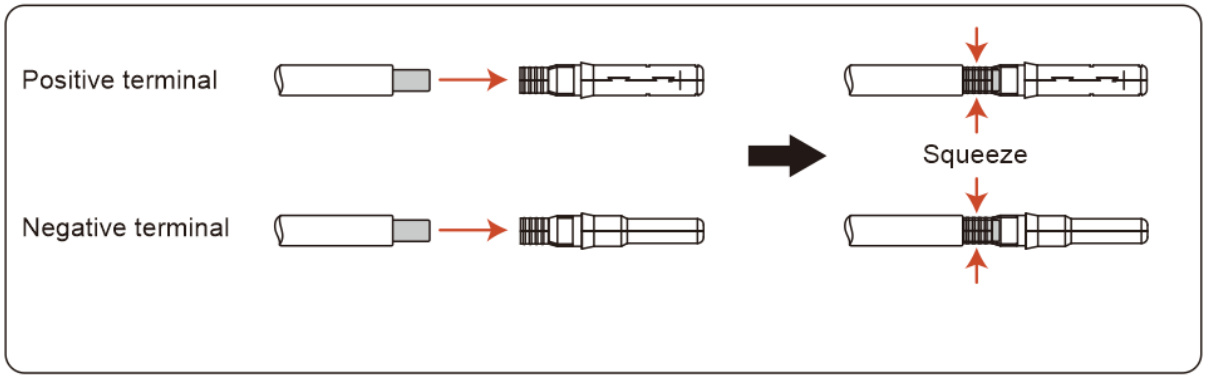


Fig. 4-34 DC Terminal Crimp

Step 5: Insert the crimped DC cable into the DC terminal firmly, then insert the waterproof rubber ring into the DC terminal and tighten the nut.

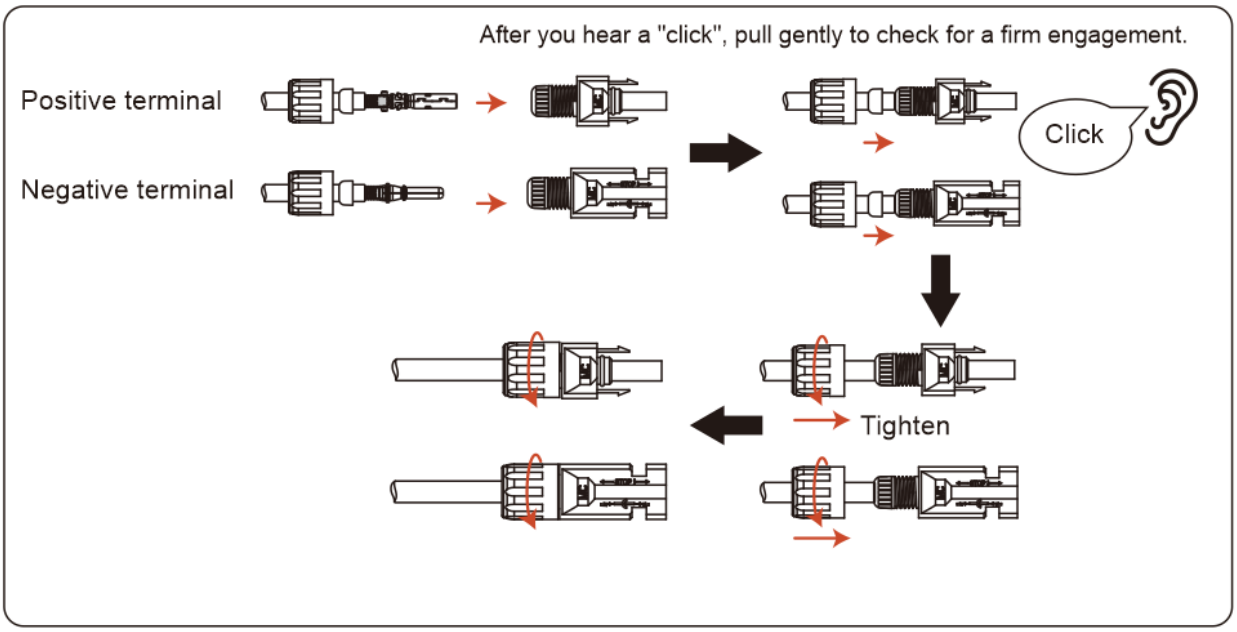


Fig. 4-35 DC Cable Installation

Step 6: Measure PV voltage of DC input with multimeter, verify DC input cable polarity.

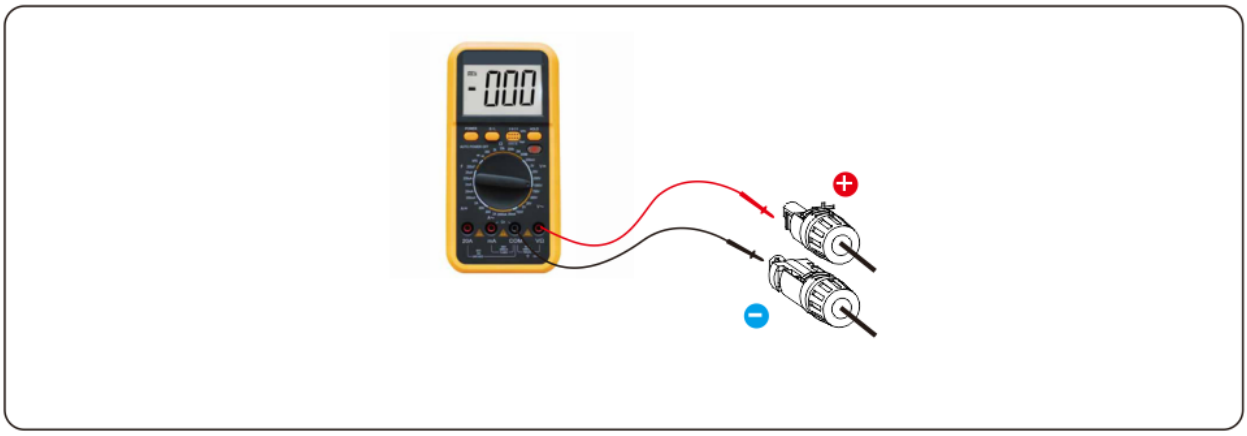


Fig. 4-36 Multimeter Check DC Input

Step 7: Connect the wired DC terminal to the inverter as shown in the figure, and a slight "click" is

heard to prove the connection is correct.

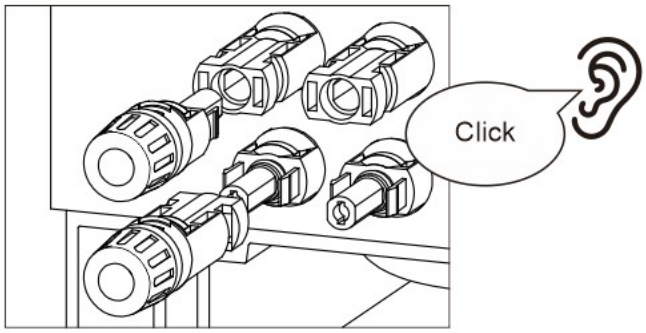


Fig. 4-37 DC Terminal to The Inverter Connection Check

CAUTION:
If DC inputs are accidentally reversely connected or inverter is faulty or not working properly, it is NOT allowed to turn off the DC switch. Otherwise it working properly, it is NOT allowed to turn off the DC switch. Otherwise it may cause DC arc and damage the inverter or even lead to a fire disaster.
The correct actions are:
Use a clip-on ammeter to measure the DC string current.
If it is above 0.5A, please wait for the solar irradiance reduces until the current decreases to below 0.5A.
Only after the current is below 0.5A, you are allowed to turn off the DC switches and disconnect the PV strings.
In order to completely eliminate the possibility of failure, please disconnect the PV strings after turning off the DC switch to avoid secondary failures due to continuous PV energy on the next day.Please note that any damages due to wrong operations are not covered in the device warranty.

4.5.3 Parallel wiring

4.5.3.1 DC Side Parallel

1-10 ESS Can be Connected: It is recommended that each battery clusters are connected to the power distribution separately.
If the cabinet is connected to an external inverter, we recommend that the external connection is sleeved or fitted with a protective case to avoid interference that may be caused by the exposure of the connecting wires.
ESS Connected to an Inverter: If the cabinet is connected to an external inverter, we recommend that the external connection is sleeved or fitted with a protective case to avoid interference that may be caused by the exposure of the connecting wires.

4.5.3.2 AC Side Parallel

1-6 ESS can be connected. It is recommended that each energy storage system is connected to the

power distribution separately, if the power distribution is not connected separately, please follow the recommended way of connection.

If the cabinet is connected to an external inverter, we recommend that the external connection is sleeved or fitted with a protective case to avoid interference that may be caused by the exposure of the connecting wires

2 Pcs ESS Connected to an Inverter: If the cabinet is connected to an external inverter, we recommend that the external connection is sleeved or fitted with a protective case to avoid interference that may be caused by the exposure of the connecting wires.

6 Pcs ESS Connected to Inverters: If the cabinet is connected to an external inverter, we recommend that the external connection is sleeved or fitted with a protective case to avoid interference that may be caused by the exposure of the connecting wires.

5 Product Operation

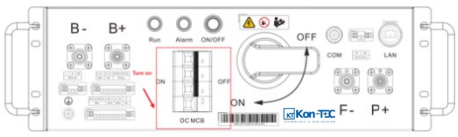
5.1 Energy Storage System Power-up Process

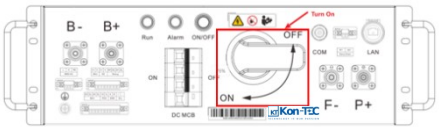
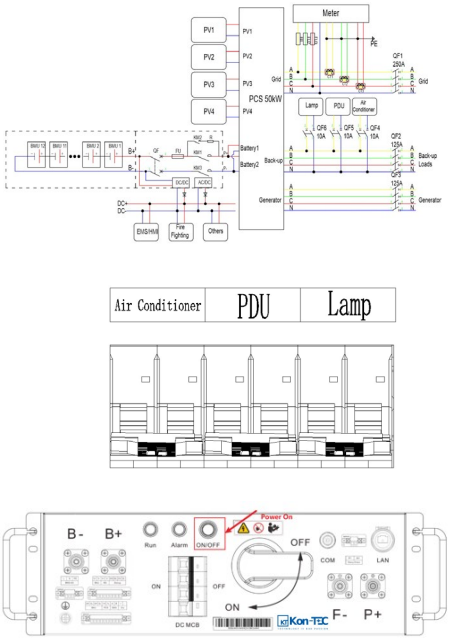
5.1.1 Pre-power-up Check

1. Check that the circuit breaker in the electrical compartment inside the storage cabinet is in the disconnected position.
2. Check whether the serial power cables between the battery packs and between the battery packs and the high voltage box are connected reliably.
3. Check that all communication and power supply cable connection terminals are connected reliably and that the grounding cable is reliable.
4. Check that the communication and power harnesses as well as the power cables are properly connected on the high voltage box panel.
5. Check that the emergency stop button is released.
6. Use a multimeter to check that the DC and AC voltages meet the startup conditions and ensure that there is no overvoltage.
7. Check and make sure that there are no unnecessary tools and devices inside the equipment.
8. Check all air inlets and outlets for blockages.

5.1.2 Power-up Procedure

Table 5-1 Power-up Procedure Steps

Steps	Check Lists	Status
Step 1	Confirm that the normal load, backup load, generator, air conditioner, PDU, lamp, and switches are in the off (disconnected) state. Verify whether there is any photovoltaic connection external to the system.	/
Step 2	Close the high-voltage box circuit breaker, close the DC MCB switch, and close the AC supply switch of the high-voltage box. The EMS and fire protection system will complete the	

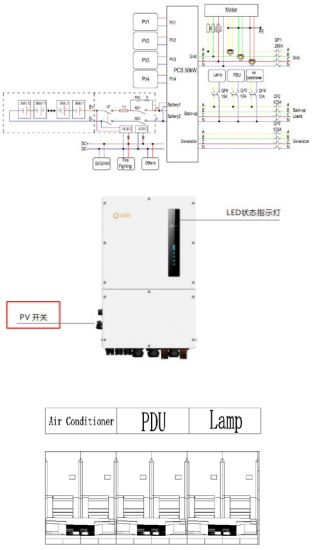
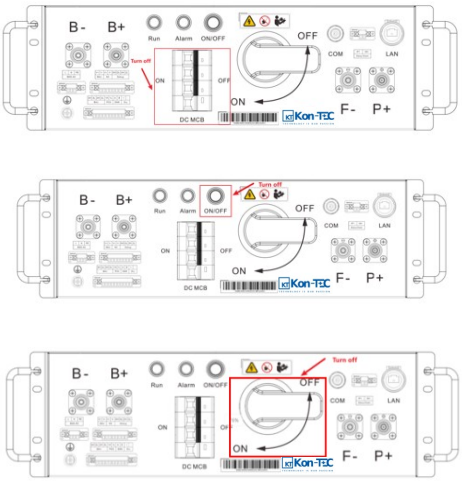
	power-up process.	
Step 3	Check the fire protection and battery status on the EMS screen. In the absence of any alarms or faults, control the closing of the high-voltage box contactor through the EMS. At this point, the battery will be energized with high voltage, and the inverter will be powered up through the DC side.	For details, refer to the EMS section part 5.3.
Step 4	The inverter grid circuit breaker (customer-supplied) turn on, the AC side of the inverter will complete the power supply. Check the inverter's current status . The APP(Local EMS or Inverter HMI) to control the inverter startup. Turn on the inverter photovoltaic (PV) switch, allowing PV power input, the inverter will then start and operate.	Check local EMS screen or inverter APP or HMI to make sure configuration is correct and error events , refer to the local EMS section part 5.3, Inverter APP * HMI part 5.2.
Step 5	Turn on the inverter backup load switch, and generator load switch (customer-supplied). Sequentially close the air conditioning, PDU, and lamp switches. Press the AC supply switch of the HV box. At this point, the air conditioner will power on, the cabinet lighting will illuminate, and the system power-up process will be complete.	

WARNING

- Please follow the steps strictly to power up
- If there is any abnormality, power down and check carefully step by step

5.1.3 Normal Shutdown Procedure

Table 5-2 Normal shutdown steps

Steps	Check Lists	Status
Step1	The local EMS controls the inverter shutdown or control Inverter APP &HMI to finish shutdown process.	Make sure software shutdown is a priority
Step 2	1. Disconnect the air conditioning unit, PDU, and lighting switches. Power off the air conditioning system and extinguish the lights. 2. Disconnect the AC supply switch of the high-voltage distribution box. Isolate the inverter backup load switch, normal load switch, and generator load switch (customer-installed). 3. The inverter will cease power output. Disconnect the photovoltaic switch, effectively stopping the inverter from receiving PV power input.	
Step 3	Disconnect the DC MCB switch, the AC supply switch of the HV box, and the fire protection system power. Also, disconnect the high-voltage box circuit breaker, completing the system shutdown procedure.	

5.1.4 Emergency Shutdown Procedure

DANGER

- In case of emergency, tap the emergency stop button on the cabinet door and the system will stop running.
- Fire Incident: Contact local professional firefighters.
- System Failure: Contact local aftermarket operator.

5.2 Hybrid Inverter APP & HMI Setting

- The basic parameter settings have been debugged before shipment, and the user does not need to make any additional adjustments.
- If any parameter adjustments are required, please contact technical support.

5.2.1 Hybrid Inverter APP Setting

The hybrid inverter app download method :

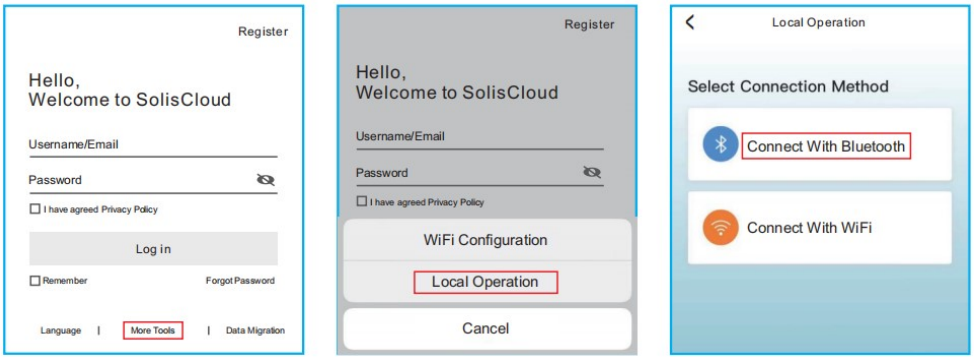
1. Scan this QR code to download Soliscloud. 2. Visit www.soliscloud.com. 3. Search"Soliscloud"in Google Play or APP Store.	

5.2.1.1 Log in the APP via Bluetooth

Step 1: Connect with Bluetooth

Turn on Bluetooth switch on your mobile phone and then open the Soliscloud APP.

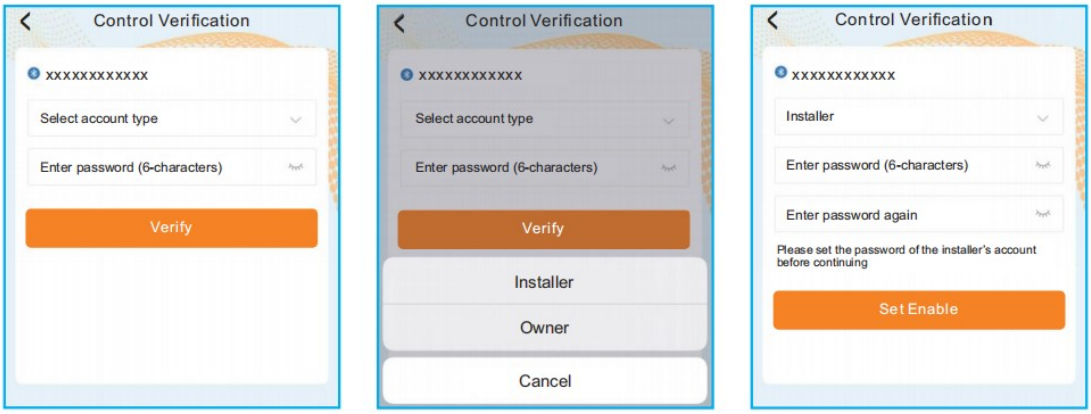
Click "More Tools"->"Local Operation"->"Connect with Bluetooth"



Step 2: Select the Bluetooth signal from the inverter. (Bluetooth Name: Inverter SN)

Step 3: Login account.

If you are the installer, please select the account type as Installer. If you are the plant owner, please select the account type as owner. Then set your own initial password for control verification. (The first log-in must be finished by installer in order to do the initial set up)

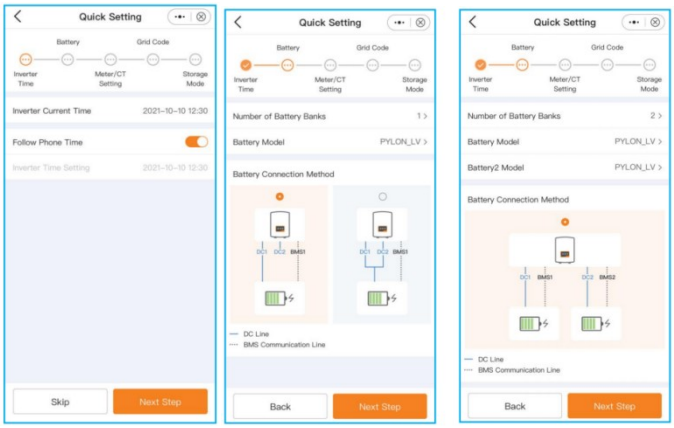


5.2.1.2 APP Quick Setting

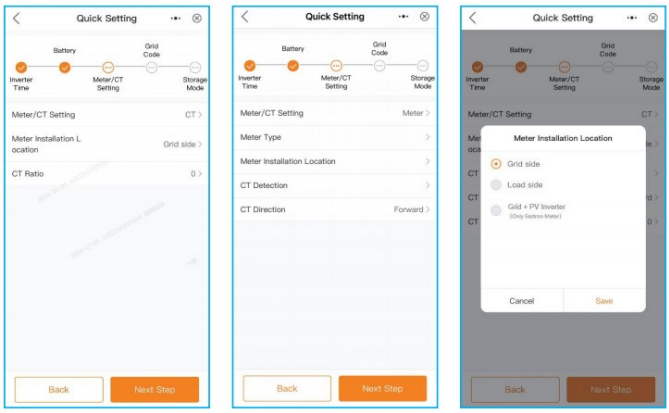
If this is the first time the inverter has been commissioned, you will need to first go through the Quick Settings. Once this has been done, these settings can be changed later.

Inverter Time -> Meter Setting -> Grid Code -> Storage mode -> Battery Model

1. **Inverter time:** Set inverter time and date, tap the slider next to "Follow Phone Time", then tap "Next step"at the bottom right corner.

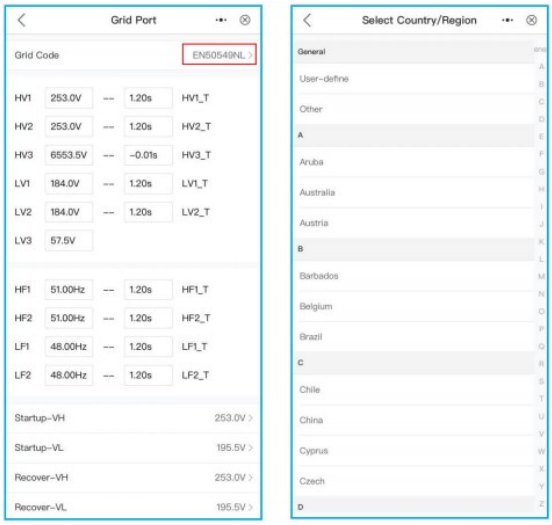


2. **Battery:**
   - Select number of battery banks ： 1-2；
   - Select battery model: if the connected battery brand is not on the list, please select "General_LiBat_HV
   - Select battery connection method.
3. **CT/Meter Setting:**
   - Select CT or Meter.
   - Set Meter type (Solis provide Eastron 3 phase meter, it is self-identifiable).
   - Set Meter installation location: Grid side / Load side / Grid+PV inverter.
   - Set CT ratio: default 60 (Solis provide ESCT-T50-300A/5A CT), if the user install their own CT, then need to set the CT ratio manually. If the system connected to Meter, then CT ratio need to be set on Meter.
   - CT direction: When CT installed correctly, select "Forward". when CT installed direction wrong, the sampling current of CT will be reversed when calculating the power, select "Reversal" to correct it.



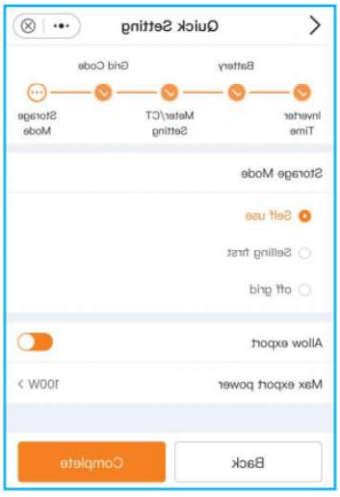
4. Grid Code:

- Select grid code that meet the local regulations.
- Three level of Over-voltage / under-voltage / Over-frequency / under-frequency are default based on grid code, there is no need to set the parameters in manual.



5. Storage Mode:

All modes first priority is to use the available PV power to support loads. The different modes determine what the second priority, or use of the excess PV power, will be. Self-use / Selling first / Off-grid are exclusive， the user could select only one mode.



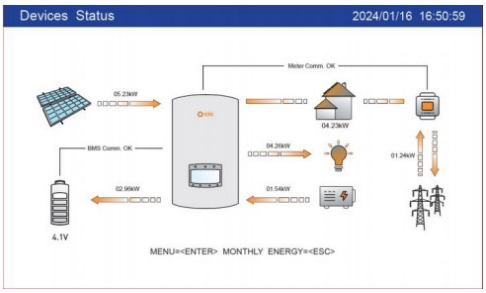
NOTICE

- Any more function detail about storage mode usage, please refer to 5.3.2 part

5.2.2 PCS HMI Setting

5.2.2.1 Detailed HMI Setting

Step 1: Enter Home page After quick setting, press "ENTER", the screen displays the home page.



The screen will be automatically turn off after being idle for a few minutes to save power, click any operation button （"ESC"/"UP"/"DOWN"/ "ENTER") to restart the screen, then press "Enter" into the main operation interface.

Step 2: Enter "SYSTEM SETTING" interface

Press"Down" button, then press "ENTER" into the "SYSTEM SETTING" interface.

Step 3: Set "Storage Mode"

Use "UP" or "DOWN" key to select the desired mode, then press "ENTER".

The Mode description please refer to 5.4.1.

NOTICE

- Any more function detail about storage mode usage, please refer to 5.3.2 part

5.3 Local EMS Interface Operation

NOTICE

- The local EMS is mainly responsible for performing checks and confirmations on the user side before the first startup, especially for the battery-side circuit breaker function.
- During subsequent operations and maintenance, the local EMS is used to monitor battery information and other auxiliary system data.
- Under normal circumstances, the user does not need to make any additional settings.

5.3.1 EMS Interface Introduction

5.3.1.1 Overview

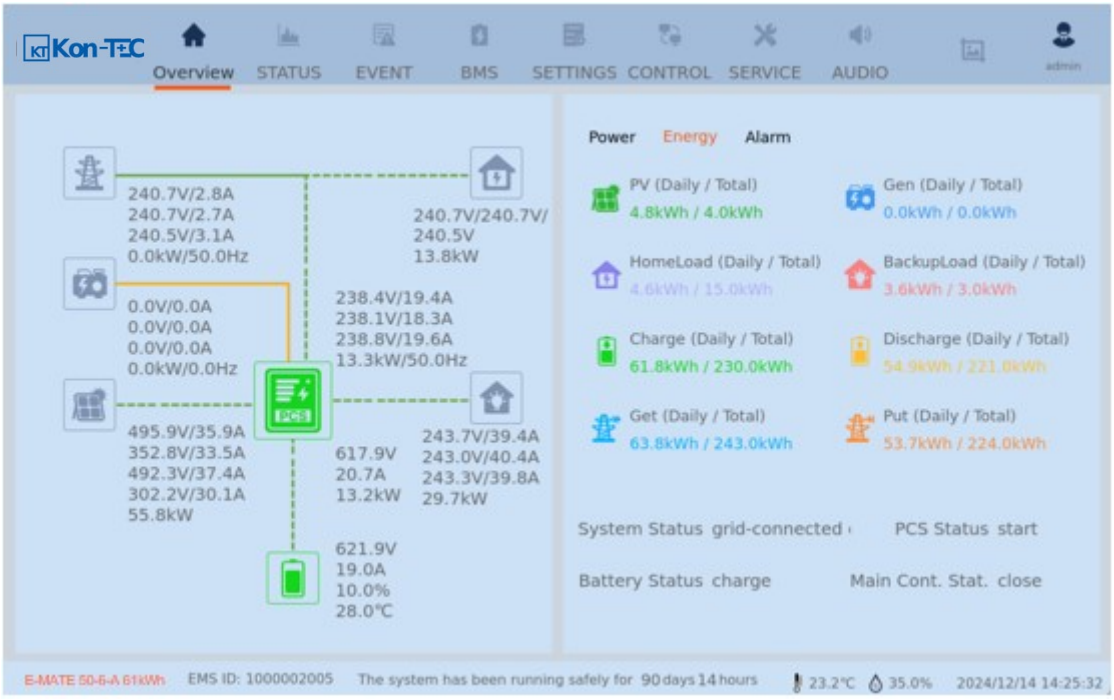


Fig. 5-1 EMS System Overview Screen

The system overview part shows the system energy flow diagram, power curve, power statistics, alarm fault statistics, etc..

5.3.1.2 Event

The event recording section records the alarm fault information of the equipment and system, and displays the current events, historical events, etc. As shown in Fig. 5-2.

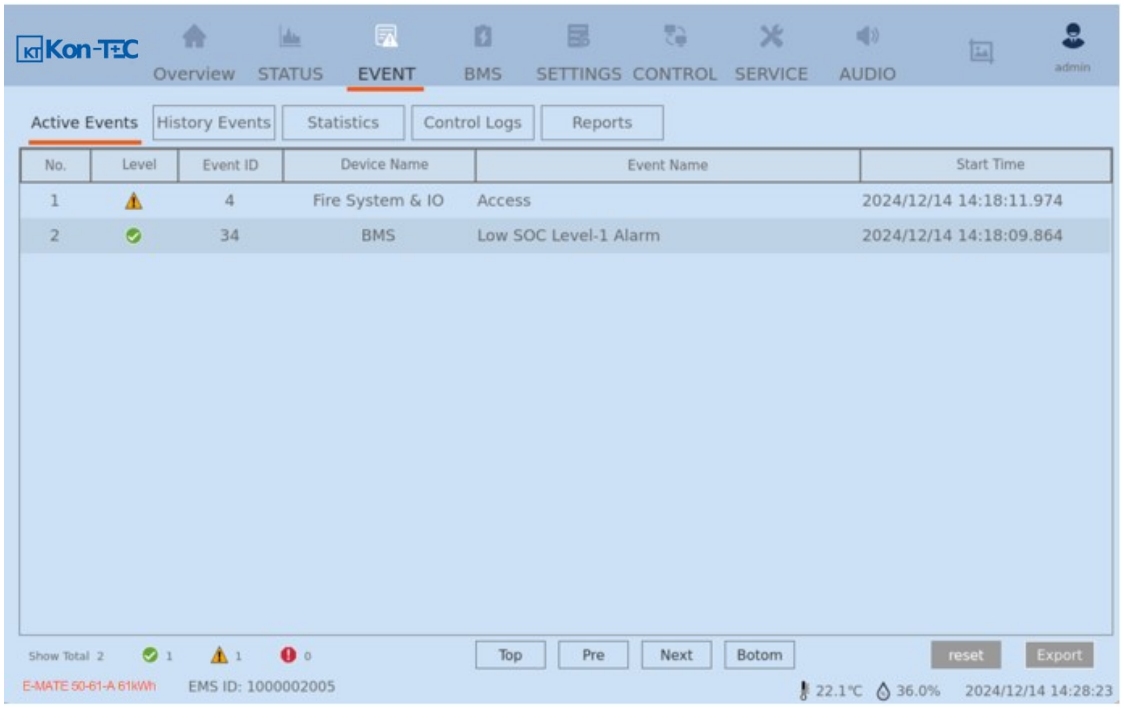


Fig. 5-2 EMS Event Logging Screen

5.3.1.3 EMS

The Battery Information section monitors the operating status of the batteries in real time. As shown in Fig. 5-3:

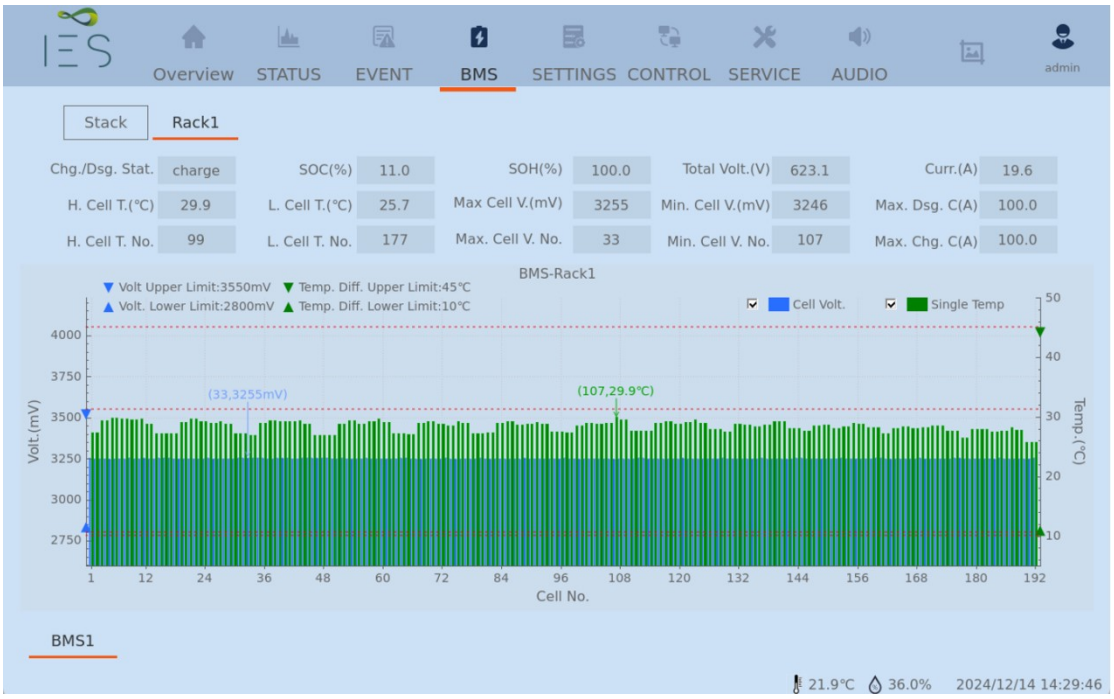


Fig. 5-3 EMS Battery Management Interface

5.3.1.4 Basic Setting

The parameter setting page provides the installation configuration and the operation configuration of the equipment parameters. As shown in Fig. 5-4:

Fig. 5-4 EMS Parameter Setting Interface

5.3.1.5 Control

The Control page provides settings for PCS turn on/turn off, close/open battery contactors, clearing faults, and selecting time period control modes, as well as configuration of 48 fixed time periods and 12 custom time periods.

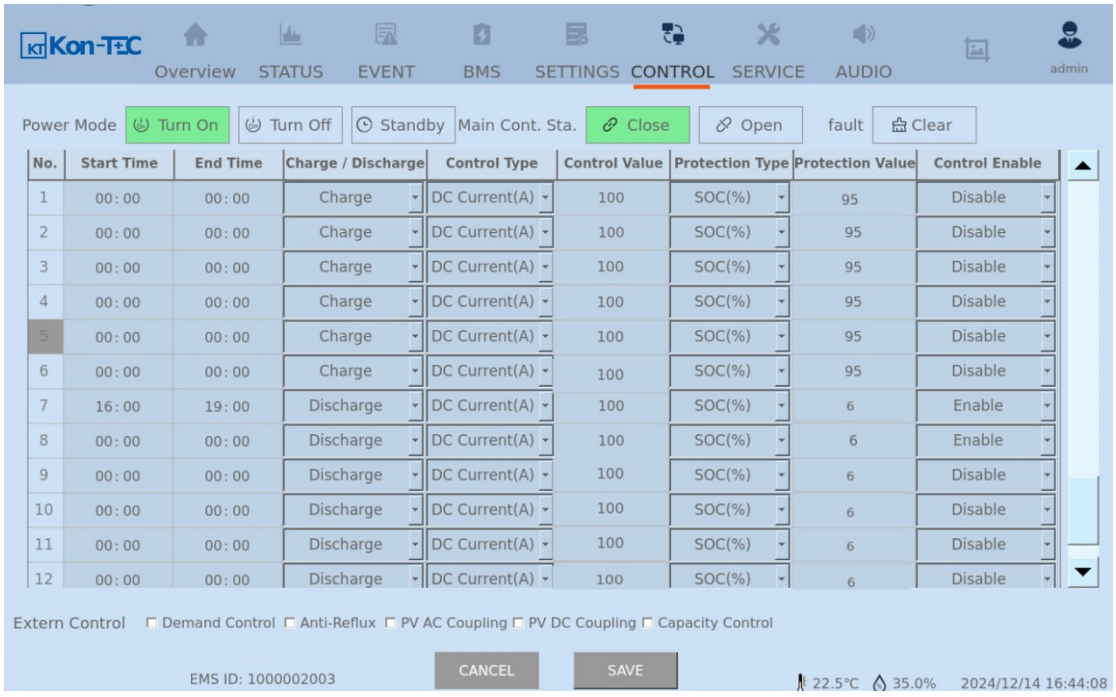


Fig. 5-5 EMS Control

Instruction

Projects 50-61 only support 12 custom time period controls. Make sure the set time period does not conflict with the existing time period, and the end time is greater than the start time. Make sure the first 6 time periods are charging, the last 6 time periods

are discharging, the control type is DC current, and the protection type is SOC.

5.3.2 Introduction of Hybrid Inverter Energy Storage Mode

There are three kinds of energy storage modes, which are Self-use, Selling first and Off grid mode.Self-use / Selling first / Off-grid are exclusive，the user could select only one mode.All modes first priority is to use the available PV power to support loads. The different modes determine what the second priority, or use of the excess PV power, will be.

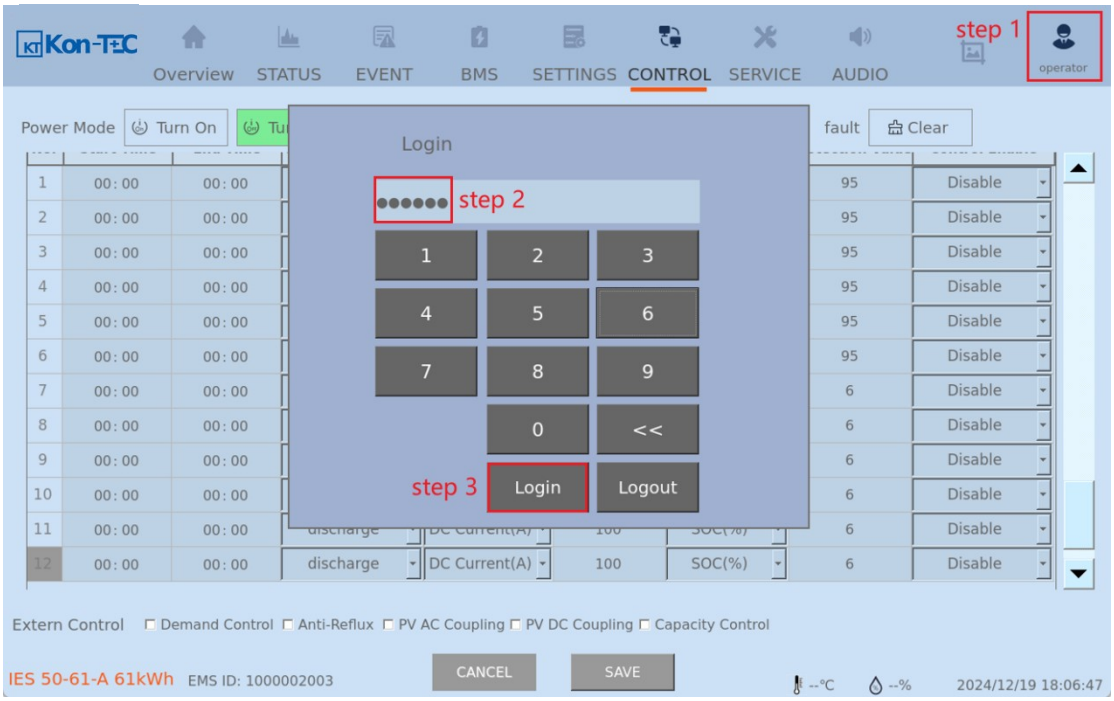
Table 5-3 Energy Storage Mode Description

Settings	Description
Self-use	PV power flow priority sequence: loads ＞ battery ＞ grid.In this mode, the system stores excess PV power into the battery after the loads are supplied. If the battery is charged full, or there is no battery, the excess PV power will be exported(sold)back to the grid.If the system is set to not export any power, then the inverter will curtail the PV power (derate the inverter output power).
Selling first	PV power flow priority sequence: loads ＞ grid ＞ battery.In this mode, the system exports any excess PV power after the loads are supplied. If the export power quota has been met, then the remaining PV power will be stored in the battery. Notice: This mode should not be used if export power set to zero.
Off grid	PV power flow priority sequence: loads ＞ battery. This mode only used when the system are not electrically connected to the grid at all.

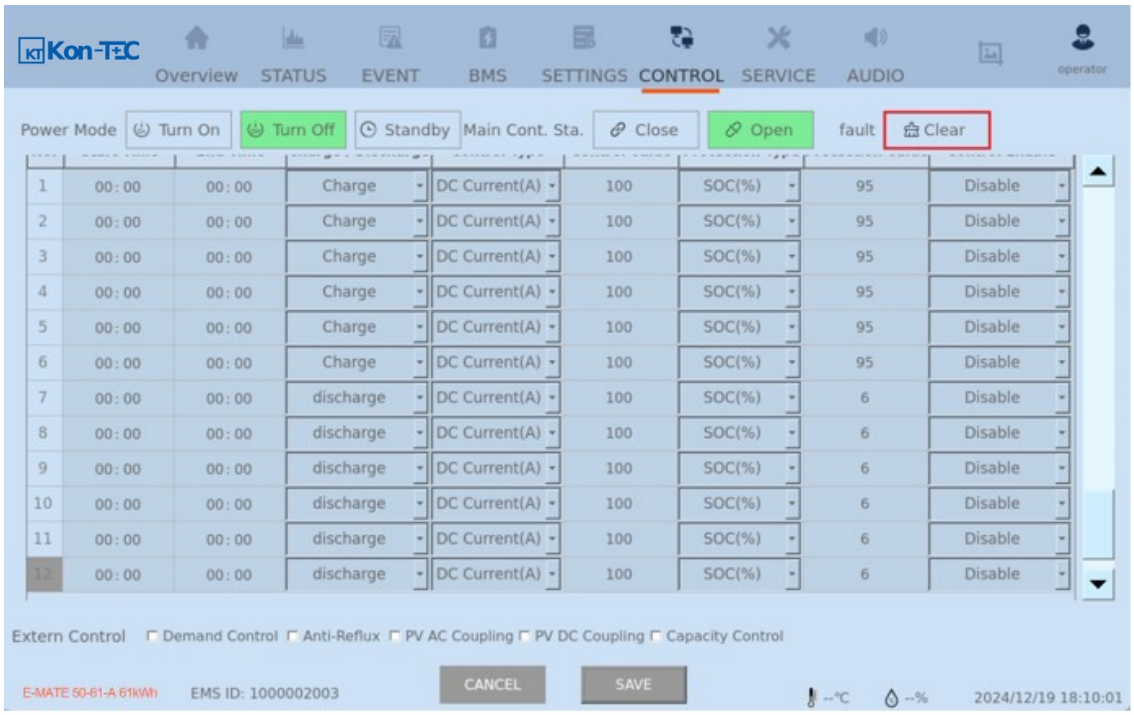
If "Allow Grid Feed-In" is enabled, the system can sell electricity to the power grid. If "Allow Grid Charging of Battery" is enabled, it is necessary to set up 12 charge-discharge time periods, which are used to charge the battery with grid power in only two scenarios: when the battery is depleted to the strong charge SOC, and when the photovoltaic power generation output during charging cannot meet the set current value. "Add Time Period" can only be set in the grid-connected state (in self-consumption and grid priority mode).If "Allow export" is enabled, the system can sell power to the grid.

5.3.3 EMS Controlled Charge/Discharge Steps

Step 1: Log in to the EMS using the "Operator" account and password 123456.



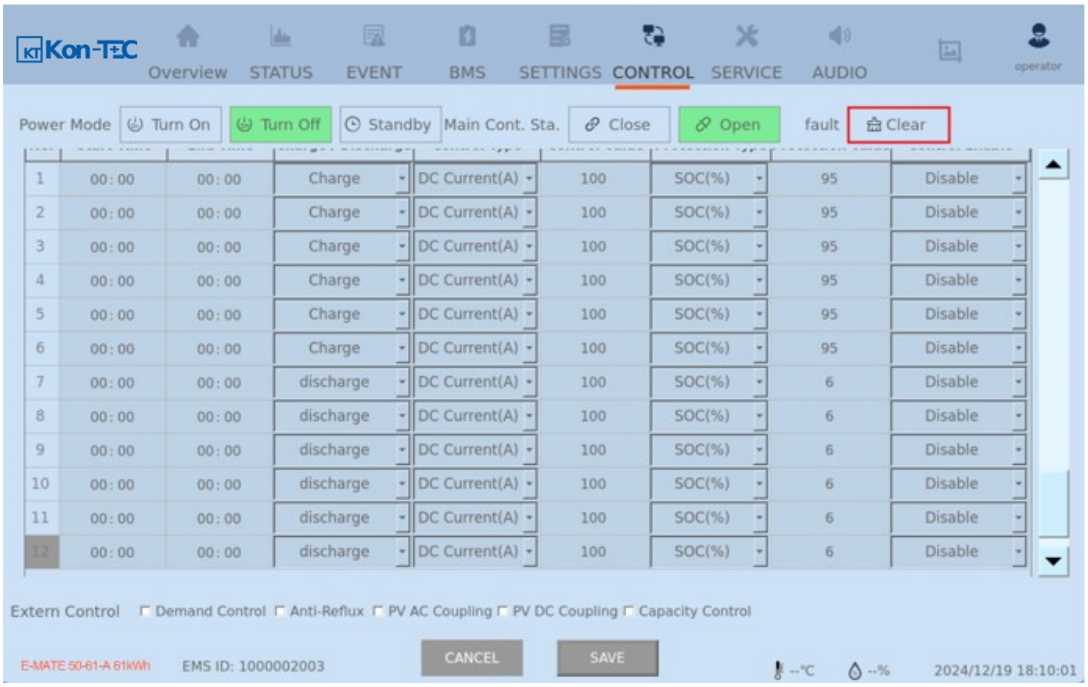
Step 2: Ensure the system operates normally, no alarm fault. If there are faults on the Event page, first investigate the cause of the fault. If the system EPO fault, first reset the EPO button, click the "Clear" button twice on the "Control Strategy" page to reset the system.



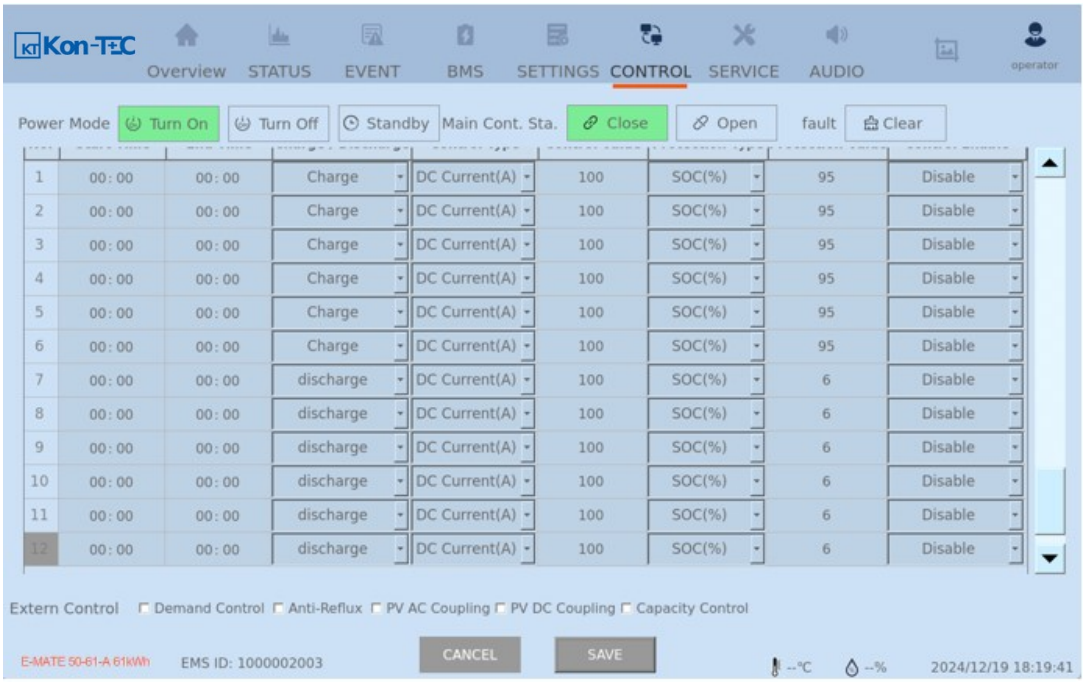
Step 3: On the 'Settings-PCS' page, the energy storage mode is set to Self-use, enabling 'Time Slot configure', enabling 'Allow Export' as shown.

Step 4: In the "Control Strategy" page, click the "Close" button to close the main contactor.

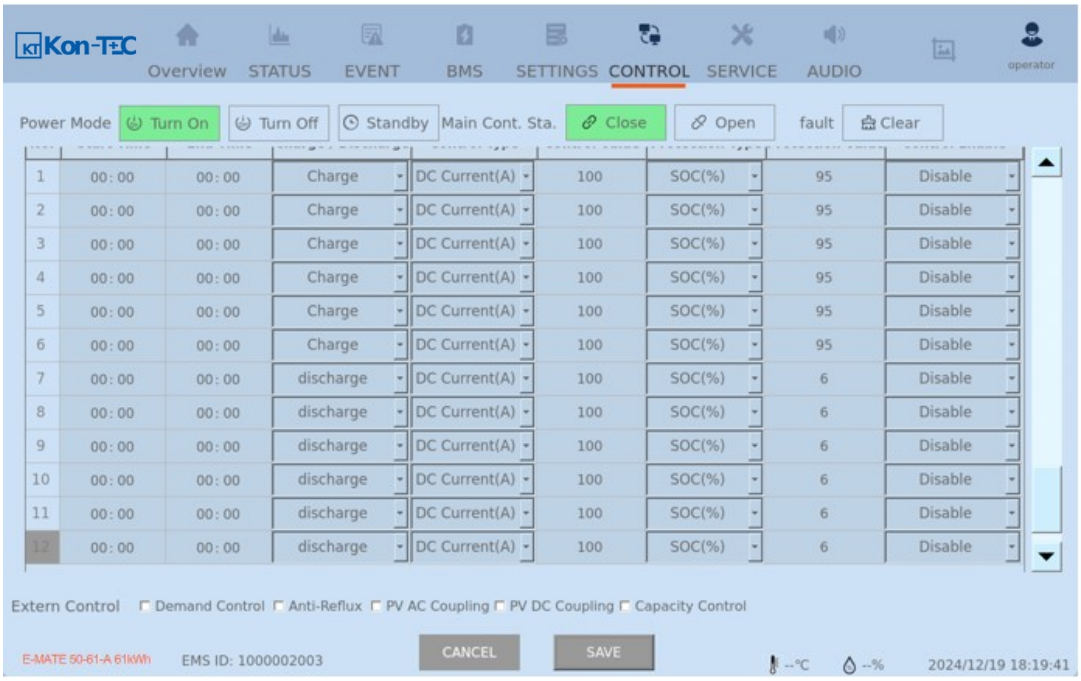
Notice: When the BMS is in the power-on self-test state, it is necessary to wait for the self-test to be completed, click the ' close ' button again, and the BMS enters the high-voltage power-on state.



Step 5: On the "Control Policy" page, click the "Turn On" button to power on PCS.

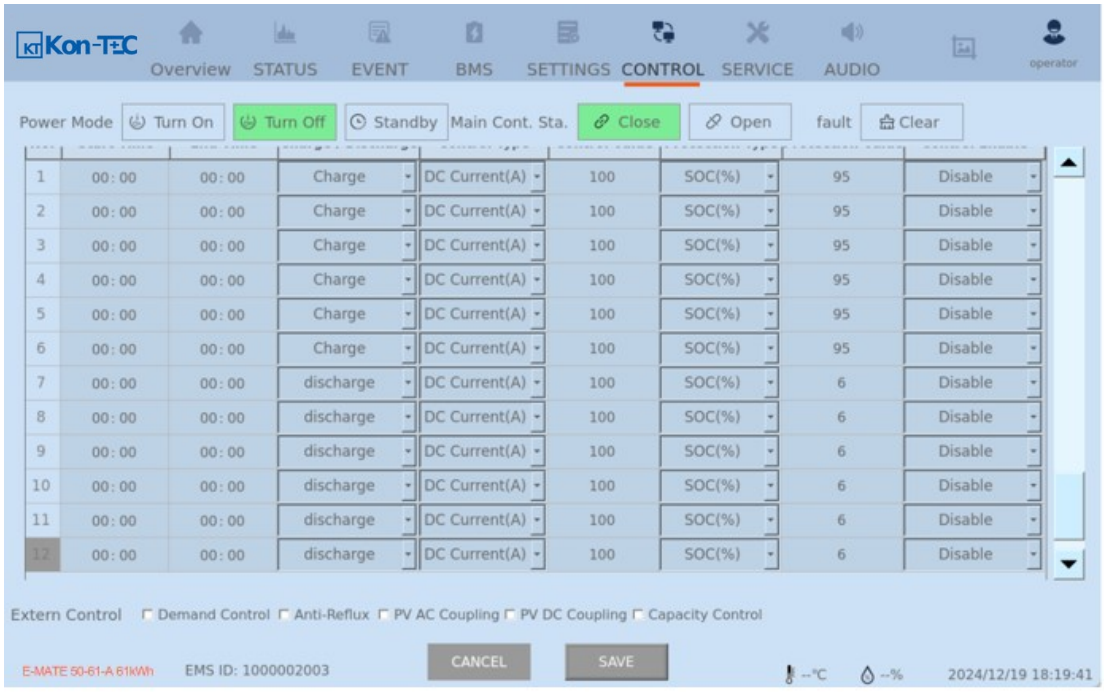


Step 6: Set a reasonable charge and discharge time period. Note : Ensure that the set time period cannot conflict with the existing time period, and the end time is greater than the start time.Set a reasonable charge and discharge current. Set a reasonable charge and discharge cut-off SOC.

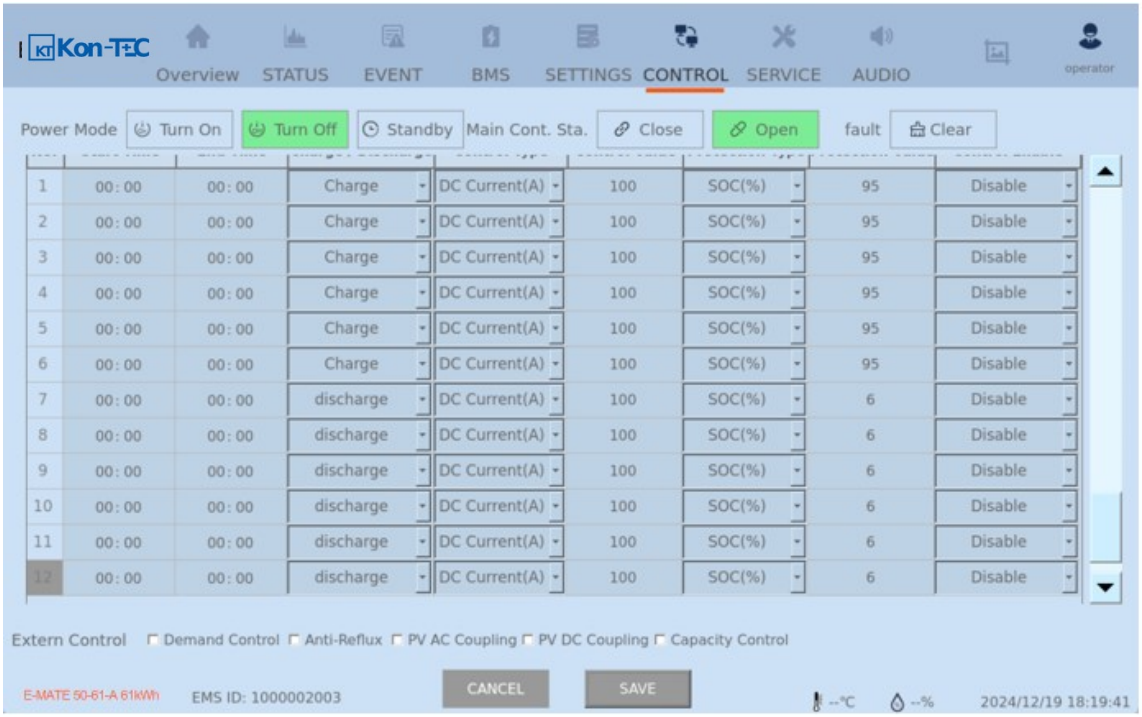


5.3.4 EMS Controlled Power off Steps

Step 1: On the "Control Strategy" page, click the "Turn off" button to shut down the PCS.



Step 2: If you need to power off completely, on the "Control Strategy" page, click the "Open" button to disconnect the battery contactor.



5.3.5 Diesel Generator Setting

When the diesel generator needs to be connect for use, please follow the steps below for setup.

- Enable in off-grid mode.
- Set the Smart port to Genset input mode, configure auto-start, set the diesel generator's start SOC range (adjustable), and set the generator charging power (adjustable).
- When the battery SOC is below 25%, the inverter outputs a dry contact signal to the generator.
- The generator is enabled, providing 3kW charging power to charge the battery. Once the battery SOC exceeds 80%, the dry contact signal is stopped, and the generator shuts down.

6 Maintenance & Disassembly

6.1 System Usage Requirements

6.1.1 Precautions Before Maintenance

> ⚠ WARNING
>
> - To avoid electric shock, do not perform any other maintenance operations beyond this manual..
> - If necessary, contact customer service for maintenance.

- Maintenance requires licensed professional maintenance personnel, non-professional maintenance personnel are prohibited to operate.
- If necessary, maintenance intervals can be shortened depending on site conditions.

6.1.2 Maintenance (Every two years)

Item	Check method
System status and cleanliness	• Check equipment inside the outdoor cabinet for any damage or deformation. • Check for any abnormal noises during the operation of the internal equipment. • Check whether the temperatures inside the outdoor cabinet and on its exterior are excessively high. • Check whether the humidity inside the outdoor cabinet is within the normal range. • Check for any signs of oxidation or rust inside the outdoor cabinet.

6.1.3 Maintenance (Once a year)

Item	Check method
System status and cleanliness	• Check the interior of the outdoor cabinet for foreign objects, dust • and grime. Remove interior dust if necessary. • Check the air inlet and outlet of the outdoor cabinet for blockages. • Check for any screw detachment inside the outdoor cabinet. • Check for any water ingress within the outdoor cabinet.
Appearance	• Check the enclosure of the outdoor cabinet for damage, paint loss, oxidation, etc. • Check the cabinet door locks, etc. for smooth operation. If necessary, apply appropriate lubricants to door locks, hinges, etc. • Check whether sealing strips, etc. are securely attached. • Properly maintained sealing strips are essential for preventing • water ingress into the product. Inspect them carefully, and • replace immediately if any sealing strips are found damaged. • Check machine warning signs and other device signs. if any • signs are blurred or damaged, replace them promptly.
Cable connections	• Check whether all incoming and outgoing cable holes of the • outdoor cabinet are well sealed. • Check cable connections for looseness. Retighten any loose • cables according to the specified torque. • Check cables for any damage, particularly for cuts on the surface in contact with metal. • Check the insulating cable ties of cable connection terminals for detachment.
Grounding and equipotential	• Check whether grounding connections are correct. The grounding resistance should not be greater than 4 Ω.

connections	• Check whether equipotential connections inside the energy storage system are correct. • Check whether the cable shielding layers are in good contact with insulation sleeves, and whether the grounding copper bars are reliably secured.
Fire protection system	• Check smoke conditions inside the battery container. • Check the external condition of the equipment for any damages or compressions from nearby equipment. • Check whether the equipment status indicator lights are normal. • Visually inspect the input/output modules. Check the external condition of the equipment for any damages or compressions from nearby equipment. Check whether the equipment status indicator lights are normal.

6.1.4 Long Without System Usage Requirements

1. Check the remaining charge and health of the battery.
2. Ensure that the battery is stored under suitable temperature and humidity conditions to prevent degradation or damage to the battery.
3. Check whether the battery management system (BMS) is working properly and ensure that the safety protection functions of the battery system are effective, including overcharging, over-discharging, short-circuit and thermal runaway protection.
4. Before being put back into service, the energy storage system should be subjected to a comprehensive system test, including battery performance, electrical connections and protective features.
5. Perform cleaning and maintenance of the system, e.g., cleaning battery contacts, checking the cooling system, etc..

6.2 Battery Maintenance

6.2.1 Maintenance Overview

⚠ WARNING

Do not leave the product in a low voltage or low SOC condition for a long period of time. Loss of capacity due to the following conditions is not covered by the warranty.

- Battery discharge cell voltage is below 2.7V for 120 consecutive hours.
- Any cell cluster SOC is 0% for 80 consecutive hours.
- Single battery discharge cell voltage ≤2.2V.

- Read the user manual or instruction manual before maintenance.
- Ensure that the battery system is shut down during maintenance.
- Please check and confirm the positive (+) and negative (-) poles before assembly.
- Check insulation before assembly to prevent short circuits.
- It must be stored according to the battery storage environment requirements.
- Maintain the removed batteries and prohibit sunlight and rain.
- Charging and discharging should be carried out in strict accordance with the requirements of

this manual.

- When the battery reaches the specified end-of-life conditions, it should be discontinued in time.

6.2.2 Battery Storage

> ⚠ NOTICE
>
> - If the system is stored for a long period of time (six months or more) without operation, the system needs to do at least 1 full charge in order to activate the battery before the system is used for the first time.
> - Battery storage requires proper storage at the appropriate temperature and humidity, otherwise it will reduce the battery's service life.
> - It is recommended to adjust the power of product storage to 30% ~ 50%.

Product storage must be kept away from fire and heat sources. When continuous static storage is required for more than 2 months, maintenance should be performed every two months.

7 Alarm Reference & Troubleshooting

7.1 EMS Trouble Shooting

EVENTID	Fault Message	Troubleshooting
-1000	Fault set	No need to deal with it.
-1001	PCS fault	Troubleshooting PCS.
-1002	PCS communication fault	Check whether the communication line between EMS and PCS is abnormal
-1003	BMS fault	Troubleshooting BMS.
-1004	BMS communication fault	Check whether the communication line between EMS and BMS is abnormal.
-1005	Fire fault	Troubleshoot fire-related faults.
-1006	Fire communication fault	Check whether the communication line between EMS and Fire is abnormal.
-1007	EPO	Confirm that the EPO has been reset and click Clear Fault
-1008	Battery low	No need to deal with it.
-2000	Alarm set	No need to deal with it.
-2001	PCS alarm	Troubleshooting PCS.
-2002	PCS communication failed	Check whether the communication line between EMS and PCS is abnormal
-2003	BMS alarm	Troubleshooting BMS.
-2004	BMS communication failed	Check whether the communication line between EMS and BMS is abnormal.
-2005	Fire alarm	Troubleshoot fire-related alarm.
-2006	Air conditioning communication failed	Check whether the air conditioner is turned on and confirm whether the

		communication line between the EMS and the air conditioner is abnormal.
-2008	Battery low	No need to deal with it.
-2009	Site communication failed	Check whether the 4G card and 4G suction cup antenna are properly plugged in. Then restart the system.

7.2 PCS Trouble Shooting

EVENTID	Fault Message	Troubleshooting
1	No grid	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
2	Grid overvoltage	
3	Grid undervoltage	
4	Grid overfreq	
5	Grid underfreq	
6	Unbalanced grid	
7	Gird frequency fluctuation	
8	Grid reverse current	
9	Grid current tracking error	
10	METER COM Fail	Check whether the communication line between PCS and electric meter is abnormal
12	Meter Select Fail	Make sure to use the factory-provided electricity meter
17	Backup overvoltage fault	1.Check whether the backup port wiring is normal 2.Restart the system, confirm that the fault continues.
18	Backup overload fault	Backup load power is too large, or some inductive load startup power is too large, need to remove some backup load, or remove the inductive load on the backup.
21	Battery not connected	1.Verify the battery voltage is within standards. 2.Measure battery voltage at plug
22	Battery overvoltage Check	Verify battery voltage is within standards. Measure battery voltage at inverter connection point. Contact your battery manufacturer for further service.
23	Battery undervoltage Check	Restart the system and check if the fault persists. If it is still not eliminated, please contact the manufacturer's customer service.
24	Battery BMS Alarm	No need to deal with it.
25	Inconsistent battery selection	Confirm whether the battery model selection is consistent with the actual one.

28	DC overvoltage	1.Check if the PV voltage is abnormal. 2.Restart the system, confirm that the fault continues
29	DC Bus overvoltage	Restart the system, confirm that the fault continues.
30	DC Bus unbalanced voltage	
31	DC Bus undervoltage	
32	DC Bus unbalanced voltage 2	
33	DC overcurrent on A circuit	Restart the system, confirm that the fault continues.
34	DC overcurrent on B circuit	
35	DC input interference	Check if the DC wires are connected correctly without loose connection.
36	Grid overcurrent	1. Confirm that the grid is abnormal. 2. Confirm that the AC cable connection is not abnormal. 3. Restart the system, confirm that the fault continues.
37	IGBT overcurrent	Restart the system, confirm that the fault continues.
38	Grid interference 02	1. Confirm whether the grid is seriously distorted. 2. Check whether the AC cable is connected reliably.
39	AFCI self-check	Restart the system, confirm that the fault continues.
40	Arc fault	Verify connections are tight within your PV system. Arc fault settings can be changed in advanced settings if further adjustment is necessary
42	DSP self-check error	Restart the system, confirm that the fault continues.
44	Grid interference	Restart the system, confirm that the fault continues.
45	Over dc components	1. Confirm that the grid is abnormal. 2. Confirm that the AC cable connection is not abnormal. 3. Restart the system, confirm that the fault continues
46	Over temperature protection	1. Check whether the surrounding environment of the inverter has poor heat dissipation. 2. Confirm whether the product installation meets the requirements
47	Relay check fault	Restart the system, confirm that the fault continues.
48	Under temperature protection	1. Check the working environment temperature of the inverter. 2. Restart the system to confirm if the fault continues.

49	PV insulation fault	1. Check whether the PV strings have insulation problems. 2. Check whether the PV cable is damaged.
50	12V undervoltage protection	1. Check current leakage to ground. Verify your grounding. Verify all wires are in good condition and not leaking current to ground.
51	Leak current protection	
52	Leak current self check protection	
53	DSP initial protection	Restart the system, confirm that the fault continues.
54	DSP B fault	Restart the system, confirm that the fault continues.
55	Battery overvoltage hardware fault	1. Check if the battery circuit breaker is tripping. 2. Check if the battery is damaged
56	LLC hardware overcurrent	1. Check whether the backup load is overloaded. 2. Restart the system, confirm that the fault continues
78	DC 3 average overcurrent	Restart the system, confirm that the fault continues.
79	DC 4 average overcurrent	Restart the system, confirm that the fault continues.
101	Grid Surge(Warn)	Grid side fault, restart the device. If it is still not eliminated, please contact the manufacturer's customer service.
102	Fan fault(Warn)	Check if the internal fan is working correctly or jammed.
1000001	Equipment comm. status	Check whether the communication line between EMS and PCS is abnormal.

7.3 BMS Trouble Shooting

EVENTID	Fault Message	Troubleshooting
1	Rack terminal over-voltage Level-1 Alarm	No need to deal with it.
2	Rack terminal over-voltage Level-2 Alarm	No need to deal with it.
3	Rack terminal over-voltage Level-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.

4	Rack terminal under-voltage Level-1 Alarm	No need to deal with it.
5	Rack terminal under-voltage Level-2 Alarm	No need to deal with it.
6	Rack terminal under-voltage Level-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
7	Rack terminal discharge over-current Level-1 Alarm	No need to deal with it.
8	Rack terminal discharge over-current Level-2 Alarm	No need to deal with it.
9	Rack terminal discharge over-current Level-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
10	Rack terminal charge over-current Level-1 Alarm	No need to deal with it.
11	Rack terminal charge over-current Level-2 Alarm	No need to deal with it.
12	Rack terminal charge over-current Level-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
13	Rack terminal isolation Level-1 Alarm	No need to deal with it.
14	Rack terminal isolation Level-2 Alarm	No need to deal with it.
15	Rack terminal isolation Level-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
16	Cell charge over-temperatureLevel-1 Alarm	No need to deal with it.

17	Cell charge over-temperatureLevel-2 Alarm	No need to deal with it.
18	Cell charge over-temperatureLevel-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
19	Cell charge under-temperatureLevel-1 Alarm	No need to deal with it.
20	Cell charge under-temperatureLevel-2 Alarm	No need to deal with it.
21	Cell charge under-temperatureLevel-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
22	Cell over-voltage Level-1 Alarm	No need to deal with it.
23	Cell over-voltage Level-2 Alarm	No need to deal with it.
24	Cell over-voltage Level-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
25	Cell under-voltage Level-1 Alarm	No need to deal with it.
26	Cell under-voltage Level-2 Alarm	No need to deal with it.
27	Cell under-voltage Level-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
28	Cell high voltage-difference Level-1 Alarm	No need to deal with it.

29	Cell high voltage-difference Level-2 Alarm	No need to deal with it.
30	Cell high voltage-difference Level-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
31	Cell high temperature-difference Level-1 Alarm	No need to deal with it.
32	Cell high temperature-difference Level-2 Alarm	No need to deal with it.
33	Cell high temperature-difference Level-3 Alarm	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
34	Low SOC Level-1 Alarm	No need to deal with it.
35	Low SOC Level-2 Alarm	No need to deal with it.
36	Low SOC Level-3 Alarm	No need to deal with it.
54	Internal CAN communication disconnect	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
55	Cell voltage DAQ abnormal	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
56	Cell temperature DAQ abnormal	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.

64	CAN Hall sensor fault	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
65	CAN Hall sensor communication fault	• Confirm the fault condition on-site and close the high-voltage box circuit breaker again. • Clear the fault and power up the system again. • If the issue is not resolved, please contact the supplier for further assistance.
71	Cell discharge over-temperature Leve-l Alarm	No need to deal with it.
72	Cell discharge over-temperature Leve-2 Alarm	No need to deal with it.
73	Cell discharge over-temperature Leve-3 Alarm	· Confirm the fault condition on-site and close the high-voltage box circuit breaker again. · Clear the fault and power up the system again. · If the issue is not resolved, please contact the supplier for further assistance.
74	Cell discharge under-temperature Leve-1 Alarm	No need to deal with it.
75	Cell discharge under-temperature Leve-2 Alarm	No need to deal with it.
76	Cell discharge under-temperature Leve-3 Alarm	· Confirm the fault condition on-site and close the high-voltage box circuit breaker again. · Clear the fault and power up the system again. · If the issue is not resolved, please contact the supplier for further assistance.
77	High SOC Level-1 Alarm	No need to deal with it.
78	High SOC Level-2 Alarm	No need to deal with it.
79	High SOC Level-3 Alarm	No need to deal with it.

7.4 Air Conditioner Trouble Shooting

EVENTID	Fault Message	Troubleshooting

1	Cabinet temperature high alarm	Check the electrical cabinet heat load, check the electricity Whether the gas tank temperature and humidity regulator works Normal, check the probe and line. Only alarm does not stop.
2	Cabinet temperature low alarm	No need to deal with it.
3	Humidity high alarm	No need to deal with it.
4	Humidity low alarm	No need to deal with it.
5	Coil freeze protection alarm	Do not open the compressor, automatic reset.
6	Defrost probe malfunction	Check probe and line.Only alarm does not stop.
7	Condensation temperature probe malfunction	Check probe and line.Automatic reset only alarm.
8	Cabinet temperature probe fault	Check probe and line.Do not open the compressor, do not open the heating, automatic reset.
10	The outlet temperature probe fault	Check probe and line.
11	Humidity probe malfunction	Check probe and line.Only alarm does not stop.Automatic reset.
12	Internal fan failure	Check the fan. Stop the whole machine, manually reset or power off to restart the power-on reset.
13	Compressor failure	Check the compressor. Do not open the compressor, manual reset.
14	High-voltage alarm	The ambient temperature is too high . filter dust fouling too much . air inlet blockage . fan failure . pressure switch failure. Not open the compressor, automatic after 2H Reset or power-down reset reset.
15	Low-voltage alarm	The ambient temperature is too low or lack of refrigerant, do not open the compressor, manual reset or power down to restart reset.
16	Phase reverse	Change the power phase sequence. Do not stop, manual reset or power down reset.
17	Equipment comm. status	Check whether the air conditioner is turned on and confirm whether the communication line between the EMS and the air conditioner is abnormal.

Kon-TEC

TECHNOLOGY IS OUR PASSION

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